LEVERAGES

Question 01

The following summarizes the percentage changes in Revenue, EBIT and the betas for four pharmaceutical Firms.

Firm	Change in Revenue	Change in Operating Income	Beta
PQR Ltd	27%	25%	1.00
RST Ltd	25%	32%	1.15
TUV Ltd	23%	36%	1.30
WXY Ltd	21%	40%	1.40

1. Calculate the Degree of Operating Leverage for each of these Firms.

2. Use the Operating Leverage to explain why these Firms have different beta.

Solution:

Firm	Change in Revenue (given)	Change in Operating Income, i.e. EBIT (given)	DOL = $\frac{\%\text{ Change in EBIT}}{\%\text{ Change in Sales}}$	Beta (given)
PQR Ltd	27%	25%	$\frac{25\%}{27\%}$ = 0.926	1.00
RST Ltd -	25%	32%	$\frac{32\%}{25\%}$ = 1.280	1.15
TUV Ltd	23%	36%	$\frac{36\%}{23\%}$ = 1.565	1.30
WXY Ltd	21%	40%	$\frac{40\%}{21\%}$ = 1.905	1.40

Inference:

1. High DOL reflects high Operating Risk. Hence, WXY Ltd (highest DOL) has the maximum Operating Risk. PQR Ltd (lowest DOL) is exposed to minimum Operating Risk, when compared to other Firms.

2. Beta is the measure of volatility of risk of a security against the Market Risk. Both Operating Leverage and Beta reveal the measure of risk. Since the Operating Leverage is different for each Firm, the Beta would also be different. Therefore, High DOL = High Risk = High Beta.

Question 02

Calculate the degree of Operating Leverage, Degree of Financial Leverage and the Degree of Combined Leverage for the following Firms and interpret the results.

Firm	P	Q	R
1. Output (in units)	2,50,000	1,25,000	7,50,000
2. Fixed Costs (₹)	5,00,000	2,50,000	10,00,000

3. Unit Variable Costs (₹)	5.00	2.00	7.50
4. Unit Selling Price (₹)	7.50	7.00	10.00
5. Interest Expenses (₹)	75,000	25,000	-

Solution:

Firm	P	Q	R
Sale Quantity	2,50,000 units	1,25,000 units	7,50,000 units
Sale Price per unit	₹ 7.50	₹ 7.00	₹ 10.00
Less: Variable Costs per unit	₹ 5.00	₹ 2.00	₹ 7.50
Contribution per unit	₹ 2.50	₹ 5.00	₹ 2.50
Total Contribution (Qtty X Cn pu)	₹ 6,25,000	₹ 6,25,000	₹ 18,75,000
Less: Fixed Costs	₹ 5,00,000	₹ 2,50,000	₹ 10,00,000
EBIT	₹ 1,25,000	₹ 3,75,000	₹ 8,75,000
Less: Interest	₹ 75,000	₹ 25,000	-
EBT	**₹ 50,000**	**₹ 3,50,000**	**₹ 8,75,000**
Degree of Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	5.00	1.67	2.14
Degree of Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}}$	2.50	1.07	1.00
Degree of Combined Leverage = DOL × DFL	12.50	1.79	2.14

Inference: Overall Risk of Firm P is the highest while that of Firm Q is the least.

Question 03

The Balance Sheet of Gitashree Ltd is given below:

Liabilities		₹	Assets	₹
Shareholders' Fund			**Fixed Assets**	**4,50,000**
Equity Share Capital of ₹ 10 each	**₹ 1,80,000**		**Current Assets**	**1,50,000**
Retained Earnings	**₹ 60,000**	**2,40,000**		
Non-Current Liabilities		**2,40,000**		
10% Debt				

Current Liabilities	1,20,000		
Total	6,00,000	Total	6,00,000

The Company's Total Asset Turnover Ratio is 4. Its Fixed Operating Cost is ₹ 2,00,000 and its Variable Operating Cost Ratio is 60%. The Income Tax Rate is 30%.

1. Calculate - (a) Degree of Operating Leverage, (b) Degree of Financial Leverage, and (c) Degree of Combined Leverage.

2. Find out EBIT if EPS is (a) ₹ 1 (b) ₹ 2 and (c) ₹ 0.

Solution:

	Particulars	Given Situation	For ₹ 1 EPS	For ₹ 2 EPS	For Nil EPS
	Sales (6,00,000 Assets × 4 times given)	24,00,000			
Less:	Variable Cost at 60%	(14,40,000)			
	Contribution	9,60,000			
Less:	Fixed Cost (given)	(2,00,000)			
	EBIT	7,60,000	**49,714**	**75,429**	**24,000**
Less:	Interest (₹ 2,40,000 at 10%)	(24,000)	(24,000)	(24,000)	(24,000)
	EBT	7,36,000	25,714	51,429	Nil
Less:	Tax at 30%	(2,20,800)	(7,714)	(15,429)	Nil
	EAT = Residual Earnings (no Pref Dividend)	5,15,200	18,000	36,000	Nil
	Number of Equity Shares (₹ 1,80,000 ÷ ₹ 10)	18,000	18,000	18,000	18,000
	EPS = $\frac{\text{Residual Earnings}}{\text{Number of Equity Shares}}$	**₹ 28.62**	Given ₹ 1	Given ₹ 2	Given **Nil**

Note: For Required EPS of ₹ 1, ₹ 2 and Nil, the calculations are made by reverse working starting backwards from EPS.

Since Tax is 30%, EAT = 70% of EBT. Hence, EBT = $\frac{\text{EAT}}{70\%}$ The other calculations are made accordingly.

DOL = $\frac{\text{Contribution}}{\text{EBIT}}$ $\frac{₹\,9,60,000}{₹\,7,60,000}$ = **1.26 times. DFL** = $\frac{\text{EBIT}}{\text{EBT}}$ = $\frac{₹\,7,60,000}{₹\,7,36,000}$ = **1.03 times.**

DCL = $\frac{\text{Contribution}}{\text{EBT}}$ = $\frac{₹\,9,60,000}{₹\,7,36,000}$ = **1.30 times** (or) **DCL** = DOL × DFL = 1.26 × 1.03 = **1.30 times.**

Question 04

The Capital Structure of the Shiva Ltd consists of Equity Share Capital of ₹ 20,00,000 (Shares of ₹ 100 par value) and ₹ 20,00,000 of 10% Debentures. Sales increased by 20% from 2,00,000

units to 2,40,000 units. The Selling Price is ₹ 10 per unit, Variable Costs amount to ₹ 6 per unit and Fixed Expenses amount to ₹ 4,00,000. The Income Tax Rate is assumed to be 50%.

(a) You are required to calculate the following:

(i) The Percentage Increase in Earnings per Share,

(ii) Financial Leverage at 2,00,000 units and 2,40,000 units.

(iii) Operating Leverage at 2,00,000 units and 2,40,000 units.

(b) Comment on the behaviour of Operating and Financial leverages in relation to increase in production from 2,00,000 units to 2,40,000 units.

Solution:

Particulars	Output: 2,00,000 units	Output: 2,40,000 units
Sales	2,00,000 × 10 = 20,00,000	2,40,000 × 10 = 24,00,000
Less: Variable Costs	2,00,000 × 6 = 12,00,000	2,40,000 × 6 = 14,40,000
Contribution	8,00,000	9,60,000
Less: Fixed Costs	4,00,000	4,00,000
EBIT	4,00,000	5,60,000
Less: Interest	20,00,000 x 10% = 2,00,000	2,00,000
EBIT	2,00,000	3,60,000
Less: Tax at 50%	1,00,000	1,80,000
EAT = Residual Earnings	1,00,000	1,80,000
Number of Equity Shares	20,00,000 ÷ 100 = 20,000	20,000
EPS = $\frac{\text{Residual Earnings}}{\text{No.of Equity Shares}}$	**₹ 5 per Share**	**₹ 9 per Share**
DOL = $\frac{\text{Contribution}}{\text{EBIT}}$ =	$\frac{₹\ 8,00,000}{₹\ 4,00,000}$ = **2.00 times**	$\frac{₹\ 9,60,000}{₹\ 5,60,000}$ = **1.71 times**
DFL = $\frac{\text{EBIT}}{\text{EBT}}$ =	$\frac{₹\ 4,00,000}{₹\ 2,00,000}$ = **2.00 times**	$\frac{₹\ 5,60,000}{₹\ 3,60,000}$ = **1.56 times**
DCL = DOL × DFL	2.00 x 2.00 = **4.00 times**	1.71 x 1.56 = **2.67 times**

Note: Percentage Increase in EPS = $\frac{₹9-₹5}{₹5}$ = 80%.

Inference: When Sales increases to 2,40,000 units, there is an overall fall in Operating &. Financial Risks, as reflected by fall in DOL and DFL. Also, EPS rises by 80%.

Question 05

The following data is available for Stone Ltd.

Sales	**₹ 5,00,000**	**Using the concept of Leverage, find out -**

Less:	Variable Cost 40%	₹ 2,00,000
	Contribution	₹ 3,00,000
Less:	Fixed Cost	₹ 2,00,000
	EBIT	₹ 1,00,000
Less:	Interest	₹ 25,000
	Profit before Tax	₹ 75,000

1. The Percentage Change in Taxable Income if EBIT increases by 10%

2. The Percentage Change in EBIT if Sales increases by 10%

3. The Percentage Change in Taxable Income if Sales increases by 10%

Also verify the results in each of the above case.

Solution: 1. Computation of Leverages

Leverage and Computation	Concept
Financial Leverage = DFL = $\frac{\text{EBIT}}{\text{EBT}} = \frac{₹\,1,00,000}{₹\,75,000}$ = **1.33 times.**	This measures the Percentage Change in Taxable Income (EBT), for every change in EBIT.
Operating Leverage = DOL = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{₹\,3,00,000}{₹\,1,00,000}$ = **3 times.**	This measures the Percentage Change in EBIT, for every change in Sales.
Combined Leverage = DCL = $\frac{\text{Contribution}}{\text{EBT}} = \frac{₹\,3,00,000}{₹\,75,000}$ = **4 times.**	This measures the Percentage Change in Taxable Income (EBT), for every change in Sales.

2. Computation of Revised Values if basic variable changes

	Situation	Revised Value as required
1	New EBT, if EBIT increases by 10%	Taxable Income (EBT) will increase by 10% x DFL 1.33 times = 13.33%. So, Revised EBT = ₹ 75,000 + 13.33% thereon = **₹ 85,000.**
2	New EBIT, if Sales increases by 10%	EBIT will increase by 10% x DOL 3 times = 30%. So, Revised EBIT = ₹ 1,00,000 + 30% thereon = **₹ 1,30,000.**
	Situation	**Revised Value as required**
3	New EBT, if Sales increases by 10%	Taxable Income (EBT) will increase by 10% x DCL 4 times = 40%. So, Revised EBT = ₹75,000 + 40% thereon = **₹ 1,05,000.**

3. Verification of Results

Particulars	₹	If EBIT increases by 10%	If Sales increases by 10%
Sales	5,00,000		5,00,000 + 10% = 5,50,000

Less:	Variable Cost 40%	2,00,000		40% on 5,50,000 = 2,20,000
	Contribution	3,00,000		3,30,000
Less:	Fixed Cost	2,00,000		2,00,000
	EBIT	1,00,000	1,00,000 + 10% = 1,10,000	**1,30,000**
Less:	Interest	25,000	25,000	25,000
	EBT	75,000	**85,000**	**1,05,000**
	Remarks		New EBT matched with WN 2(1)	New EBIT matched with WN 2(2) New EBT matched with WN 2(3)

Question 06

The information related to XYZ Company Ltd for the year ended 31st March are as follows:

Equity Share Capital of ₹ 100 each	**₹ 50 Lakhs**	**Financial Leverage**	**1.39**
12% Bonds of ₹ 1000 each	**₹ 30 Lakhs**	**Profit - Volume Ratio**	**25%**
Sales	**₹ 84 Lakhs**	**Market Price per Equity Share**	**₹ 200**
Fixed Cost (excluding Interest)	**₹ 7.5 Lakhs**	**Income Tax Rate Applicable**	**30%**

Required: Compute the following - (1) Operating Leverage, (2) Combined Leverage, (3) Earnings per Share, (4) Earnings Yield.

Solution:

	Particulars		**₹**
	Contribution at 25% on Sales of ₹ 84,00,000		21,00,000
Less:	Fixed Cost		7,50,000
	EBIT		13,50,000
Less:	Interest Expense: on Bonds (12% of ₹ 30,00,000)	3,60,000	
	on Other Debt (balancing figure)	**[18,777]**	13,50,000 - 9,71,223 = 3,78,777
	EBT [See **Note** below]		9,71,223
Less:	Tax @ 30%		2,91,367
	EAT		6,79,856

1. Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}} = \frac{21,00,000}{13,50,000}$ = **1.56 times.**

2. Combined Leverage = $\frac{\text{Contribution}}{\text{EBT}} = \frac{21,00,000}{9,71,223}$ = **2.16 times** [or DOL × DFL = 1.56 × 1.39 = 2.16 times]

3. EPS = $\frac{\text{EAT}}{\text{No.of Equity Shares}} = \frac{6,79,856}{50,000}$ = **₹ 13.60 per Share. [Note:** No. of Equity Shares = $\frac{50,00,000}{100}$ = 50,000]

4. Earnings Yield = $\frac{\text{EPS}}{\text{Market Price per Share}} = \frac{13.60}{200}$ = **6.80%**

Note: Financial Leverage = $\frac{\text{EBIT}}{\text{EBT}} = \frac{13,50,000}{\text{EBT}}$ = 1.39 (given). On solving, EBT = $\frac{13,50,000}{1.39}$ = **₹ 9,71,223**

Alternative: The Answers can be computed even by ignoring the DFL given in the Question 1.39 times. In such case, Interest will be only ₹ 3,60,000. So, EBT, EAT, Combined Leverage, EPS and Earnings Yield will be ₹ 9,90,000, ₹ 6,93,000, 2.12 times, ₹ 13.86 and 6.93% respectively.

Question 07

From the following data of company X and Y prepare their income statements

Particulars	Company X	Company Y
Margin of Safety	0.20	0.25
Profit Volume Ratio	25%	33.33%
Tax Rate	30%	30%
Interest Expenses	₹ 60,000	₹ 40,000
Financial Leverage	4:1	3:1

Solution: Income Statement

Particulars		Company A	Company B
	Sales	(Contrib ÷ PVR) 16,00,000	(Contrib ÷ PVR) 7,20,000
Less:	Variable Cost	(bal.fig) (Sales - Contribn) 12,00,000	(bal.fig) (Sales - Contribn) 4,80,000
	Contribution	(See **Note 2** below) 4,00,000	(See **Note 2** below) 2,40,000
Less:	Fixed Cost	(Contribution less EBIT) 3,20,000	(Contribution less EBIT) 1,80,000
	EBIT	(reverse working) (EBT + Interest) 80,000	(reverse working) (EBT + Interest) 60,000
Less:	Interest	(Given) 60,000	(Given) 40,000
	EBT	(See **Note 1** below) 20,000	(See **Note 1** below) 20,000
Less:	Tax	(30% on EBT) 6,000	(30% on EBT) 6,000
	EAT	(EBT - Tax) 14,000	(EBT - Tax) 14,000

Note 1: Computation	DFL = $\frac{EBIT}{EBT} = \frac{EBT+Interest}{EBT}$ = 4 times. So, $\frac{EBT+60,000}{EBT}$ = 4. On solving, EBT = 20,000	DFL = $\frac{EBIT}{EBT} = \frac{EBT+Interest}{EBT}$ = 3 times. So, $\frac{EBT+40,000}{EBT}$ = 3. Hence, **EBT = 20,000**
Note 2: Computation	DOL = $\frac{1}{MOS} = \frac{1}{0.20}$ = 5 times = $\frac{Contribution}{EBIT}$ So, $\frac{Contribution}{80,000}$ = 5. So, Contrib. = **4,00,000**	DOL=$\frac{1}{MOS} = \frac{1}{0.25}$ = 4 times = $\frac{Contribution}{EBIT}$ So, $\frac{Contribution}{60,000}$ = 4. So, Contrib. = **2,40,000**

Question 08

The following data have been extracted from the books of LM Ltd:

(a) Sales - ₹ 100 Lakhs (c) Operating Leverage -1.2

(b) Interest payable per annum-₹ 10 Lakhs (d) Combined Leverage-2.16

You are required to calculate - (1) The Financial Leverage, (2) Fixed Cost, and (3) P/V Ratio.

Solution:

1. DCL = DOL × DFL. Substituting, we have 2.16 = 1.2 × DFL. Hence, **DFL** = $\frac{2.16}{1.20}$ = **1.8 times.**

2. We know that DFL= $\frac{EBIT}{EBT}$ So, DFL = $\frac{EBIT}{EBIT-Interest}$ Interest on Debt = ₹ 10 Lakhs

Substituting, we have, DFL = 1.8 = $\frac{EBIT}{EBIT-10\ Lakhs}$. On solving, **EBIT** = $\frac{18\ Lakhs}{0.8}$ = **₹ 22.5 Lakhs.**

3. DOL = $\frac{Contribution}{EBIT} = \frac{Contribution}{22.5\ Lakhs}$ = 1.2. So, Contribution = ₹ 27 Lakhs.

5. From the above, the P&L Statement is prepared as under-

Particulars	Computation	₹ in Lakhs
Sales	Given	100.00
Less: Variable Costs	(balancing figure) (Sales - Contribution)	(73.00)
Contribution	(as computed above in WN 3)	27.00
Less: Fixed Costs	(balancing figure) (Contribution - Fixed Costs)	(4.50)
EBIT	(as computed above in WN 2)	22.50
Less: Interest	Given	10.00
EBT	(EBIT - EBT)	12.50

PV Ratio = $\frac{Contribution}{Sales} = \frac{₹\ 27\ Lakhs}{₹\ 100\ Lakhs}$ = **27%.**

COC & CAPITAL STRUCTURE

Question 09

Alpha Ltd has furnished the following information:

Earning Per Share (EPS)	₹4	Rate of Tax	30%
Dividend Payout Ratio	25%	Growth Rate of Dividend	8%
Market Price per Share	₹ 50		

The Company wants to raise Additional Capital of ₹ 10 Lakhs including debt of ₹ 4 Lakhs. The Cost of Debt (before tax) is 10% up to ₹ 2 Lakhs & 15% beyond that. Compute the After Tax Cost of Equity and Debt and also Weighted Average Cost of Capital.

Solution:

	Particulars	Result
1.	Interest on Loan = (₹ 2,00,000 × 10%) + (₹ 2,00,000 × 15%) = ₹ 20,000 + ₹ 30,000 =	₹ 50,000
2.	$K_d = \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Net Proceeds of Issue}} = \frac{₹\,50{,}000 \times (100\% - 30\%)}{₹\,4{,}00{,}000} =$	**8.75%**
3.	$K_e = \frac{DPS_1}{MPS_0} + g = \frac{₹4 \times 25\% \times 110\%}{₹50} + 10\% = 2.2\% + 10\% =$	**12.20%**
4.	$K_o = (K_d \times W_d) + (K_e \times W_e) = (8.75\% \times 40\%) + (12.20\% \times 60\%) =$	**10.82%**

Note: DPS_1 has been considered in computation of K_e. Alternatively, Earnings-Growth model may also be applied. In such case, K_e and K_o will be 18.80% and 14.78% respectively.

Question 10

ABC Private Limited wishes to raise additional finance of ₹ 30 Lakhs for purchasing a machine. It has ₹ 16 Lakhs in the form of Retained Earnings which is available for investment purposes. The following details are provided by the Company:

1.	Debt-Equity Mix	1:2
2.	Earnings per Share	₹ 10
3.	Current Market Price per Share	₹ 50
4.	Tax Rate	30%
.5.	Dividend Payout	50% of Earnings
6.	Expected Growth Rate in Dividend	10%
7.	Cost of Debt: upto ₹ 6 Lakhs 12% (before tax)	
	beyond ₹ 6 Lakhs 15% (before tax)	

You are required to -

1. Determine the pattern for raising the additional finance, assuming that the Firm intends to maintain existing debt-equity mix.

2. Determine the Post-Tax Average Cost of Additional Debt.

3. Determine the Cost of Retained Earnings and Cost of Equity.

4. Compute the Overall Weighted Average After Tax Cost of additional finance.

Solution:

1.Pattern for raising the Additional Finance of ₹ 30 Lakhs

Debt = 1/3rd = ₹ **10,00,000** | Equity = 2/3rd = ₹ **20,00,000**

Loan No.1	**Loan No.2**	**Existing** R&S		**Fresh** Funds reqd
₹ 6,00,000	₹ 4,00,000 (b/f)	Given ₹ 16,00,000		₹ 4,00,000 (b/f)
Interest at 12%	Interest at 15%	(Bonus Issue)		(Rights Issue)
Interest = ₹ 72,000	Interest = ₹ 60,000	MPS = ₹ 50	<-Issue Price->	MPS = ₹ 50
		32,000 Shares	<-No.of Shares->	8,000 Shares

Total Interest = ₹ 1,32,000

Note: Issue Price = Current MPS = ₹ **50**

2.Computation of Cost of Capital

1. $K_d = \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Net Proceeds of Issue}} = \frac{₹\,1,32,000 \times (100\% - 30\%)}{10,00,000}$	**9.24%**
2. $K_r = K_e = \frac{DPS_1}{MPS_0} + g = \frac{₹10 \times 50\% \text{ Dividend} \times 110\%}{₹50} + 10\% = 11\% + 10\%$	**21.00%**
3. $K_o = (Kq \times W_d) + (K_e \times W_e) = (9.24\% \times 1/3^{rd}) + (21.00\% \times 2/3^{rd}) = 3.08\% + 14.00\%$	**17.08%**

Note 1: DPS_1 has been considered in computation of K_e. Alternatively, Earnings-Growth model may also be applied.

Note 2: Shareholders' Personal Tax Rate is not considered in **K_r** in the above computation.

Alternatively, K_r may be taken as **Post Tax Opportunity Cost** = $K_e (1 - t_p)$ = 21.00% × (100%- 30%) = **14.70%.**

(assuming Shareholders' Personal Tax Rate is also 30%). In such case, K_o will be computed as under -

Component	₹	%	**Individual Cost**	**WACC**
Debt	10,00,000	33.33%	Q = 9.24%	3.08%
Retained Earnings	16,00,000	53.33%	K_r = 14.70%	7.84%
Equity Capital	4,00,000	13.34%	K_e= 21.00%	2.80%
Total	**30,00,000**	**100%**	**WACC** = K_o =	**13.72%**

Question 11

A Company wants to raise additional finance of ₹ 5 Crores in the next year. The Company expects to retain ₹ 1 Crore earning next year. Further details are as follows:

1. The amount will be raised by Equity and Debt in the ratio of 3:1.

2. The additional issue of Equity Shares will result in Price per Share being fixed at ₹ 25.

3. The Debt Capital raised by way of Term Loan will cost 10% for the first ₹ 75 Lakhs and 12% for the next ₹ 50 Lakhs.

4. The Net Expected Dividend on Equity Shares is ₹ 2 per Share. The Dividend is expected to grow at the rate of 5%.

5. Income Tax Rate is 25%.

You are required:

(a) To determine the amount of Equity and Debt for raising additional finance.

(b) To determine the Post-Tax Average Cost of Additional Debt.

(c) To determine the Cost of Retained Earnings and Cost of Equity.

(d) To compute the Overall Weighted Average Cost of Additional Finance after Tax.

Solution: 1. Pattern for raising the Additional Finance of ₹ 5 Crores (₹ 500 Lakhs)

Debt = 1/4th = ₹ **125 Lakhs** | Equity = 3/4th ₹ **375 Lakhs**

Loan No.1	**Loan No.2**	**Existing** R&S		**Fresh** Funds reqd
₹ 75 Lakhs	₹ 50 Lakhs (b/f)	Given ₹ 100 Lakhs		₹ 275 Lakhs (b/f)
Interest at 10%	Interest at 12%	(Bonus Issue)		(Rights Issue)
Interest = ₹ 7.5 Lakhs	Interest = ₹ 6 Lakhs	MPS = ₹ 25	<-Issue Price->	MPS = ₹ 25
		4 Lakh Shares	<-No.of Shares->	11 Lakh Shares

Total Interest = ₹ 13.50 Lakhs

Note: Issue Price = Given MPS = ₹ **25**

2.Computation of Cost of Capital

Particulars	**Result**
1. $K_d = \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Net Proceeds of Issue}} = \frac{₹\ 13.5\ \text{Lakhs} \times (100\% - 25\%)}{₹125\ \text{Lakhs}}$	**8.10%**
2. $K_r = K_e = \frac{DPS_1}{MPS_0} + g = \frac{₹2 \times 105\%}{₹25} + 5\% = 8.40\% + 5\%$	**13.40%**
3. $K_o = (K_d \times W_d) + (K_e \times W_e) = (8.10\% \times 1/4^{th}) + (13.40\% \times 3/4^{th}) = 2.03\% + 10.05\%$	**12.08%**

Note 1: Expected Dividend DPS_1 has been considered in computation of K_e. Alternatively, ₹ 2 may be

considered as DPS_1.

Note 2: Shareholders' Personal Tax Rate is not considered in **K_r** in the above computation.

Alternatively, K_r may be taken as **Post Tax Opportunity Cost** = $K_e (1 - t_p)$ = 13.00% × (100%- 25%) = **9.75%.**

(assuming Shareholders' Personal Tax Rate is also 25%). In such case, K_o will be computed as under -

Component	₹ Lakhs	%	Individual Cost	WACC
Debt	125	25.00%	K_d = 8.10%	2.03%
Retained Earnings	100	20.00%	K_r = 9.75%	1.95%
Equity Capital	275	55.00%	K_e = 13.40%	7.37%
Total	**500**	**100%**	**WACC = K_o =**	**11.35%**

Question 12

The Capital Structure of MNP Ltd is as under-

Particulars	Amount	Remarks
9% Debentures	₹ 2,75,000	₹ 100 per Debenture redeemable at par has 2% Floatation Cost and 10 years of maturity. The Market Price per Debenture is ₹ 105.
11% Preference Shares	₹ 2,25,000	₹ 100 per Preference Share redeemable at par has 3% Floatation Cost and 10 years of maturity. Market Price per Preference Share is ₹ 106.
Equity Shares (Face Value: ₹ 10 per share)	₹ 5,00,000	Equity Share has ₹ 4 Floatation Cost and Market Price per Share of ₹ 24. The expected dividend next year is ₹ 2 per Share with annual growth of 5%. The Firm has a practice of paying all earnings in the form of Dividends.

Corporate Income-Tax Rate is 35% Required: Calculate Weighted Average Cost of Capital (WACC) using Market Value Weights.

Solution: 1. Computation of Cost of Debt

$$K_d = \frac{\text{Interest } (100 - \text{Tax}) + \frac{\text{Redemption Value} - \text{Net Proceeds}}{\text{Number of years}}}{\frac{\text{Redemption Value} + \text{Net Proceeds}}{2}} = \frac{[(9\times 65\%) + \frac{(100-98)}{10}]}{\frac{(100+98)}{2}} = 6.11\%$$

2. Computation of Cost of Preference Share Capital

$$K_p = \frac{\text{Preference Dividend} + \frac{\text{Re demption Value} - \text{Net Proceeds}}{\text{Number of years}}}{\frac{\text{Redemption Value} + \text{Net Proceeds}}{2}} = \frac{[11 + \frac{(100-97)}{10}]}{\frac{(100+97)}{2}} = 11.47\%$$

Note: Alternative approaches are available in respect of computation of Cost of Debt and Preference Capital.

3. Computation of Cost of Equity under Dividend Approach

$$K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} + g(\text{Growth Rate}) = \frac{₹2}{₹24 - ₹4} + 5\% = 15.00\%.$$

Note: Floatation Cost of ₹ 4 is deducted in the Denominator and Net Issue Price is considered for K_e purposes.

Alternative Assumption: Floatation Cost may be ignored when computing K_e through Dividend-Growth Approach. K_e in such case = **13.33%.**

4. Computation of WACC based on Market Value Proportions

Item	Nos.	Mkt Price	Mkt Value	%	Cost	WACC
Debentures	$\frac{₹\ 2,75,000}{₹\ 100}$ = 2,750 Debentures	₹ 105	₹ 2,88,750	16.72%	K_d = 6.11%	1.02%
Preference Capital	$\frac{₹\ 2,25,000}{₹\ 100}$ = 2,250 Pref. Shares	₹ 106	₹ 2,38,500	13.81%	K_p = 11.47%	1.58%
Equity Capital	$\frac{₹\ 5,00,000}{₹\ 10}$ = 50,000 Equity Shares	₹ 24	₹ 12,00,000	69.47%	K_e = 15.00%	10.42%
			₹ 17,27,250	100.00%	K_o =	**13.02%**

Question 13

The Capital Structure of PQR Ltd is as follows:

10% Debentures	**₹ 3,00,000**
12% Preference Shares	**₹ 2,50,000**
Equity Share (Face Value ₹ 10 per Share)	**₹ 5,00,000**
	₹ 10,50,000

Additional Information:

• ₹ 100 per Debenture redeemable at par has 2% Floatation Cost & 10 years of maturity. The Market Price per Debenture is ₹ 110.

• ₹ 100 per Preference Share redeemable at par has 3% Floatation Cost & 10 years of maturity. The Market Price per

Preference Share is ₹ 108.

• Equity Share has ₹ 4 Floatation Cost and Market Price per Share of ₹ 25. The next year expected Dividend is ₹ 2 per Share with annual growth of 5%. The Firm has a practice of paying all earnings in the form of Dividends.

• Corporate Income Tax Rate is 30%.

Required: Calculate Weighted Average Cost of Capital (WACC) using Market Value Weights.

Solution: 1. Computation of Cost of Debt

$$K_d = \frac{\text{Interest } (100-\text{Tax}) + \frac{\text{Redemption Value} - \text{Net Proceeds}}{\text{Number of years}}}{\frac{\text{Redemption Value} + \text{Net Proceeds}}{2}} = \frac{\left[(10\times 70\%) + \frac{(100-98)}{10}\right]}{\frac{(100+98)}{2}} = 7.27\%$$

2. Computation of Cost of Preference Share Capital

$$K_p = \frac{\text{Preference Dividend} + \frac{\text{Redemption Value} - \text{Net Proceeds}}{\text{Number of years}}}{\frac{\text{Redemption Value} + \text{Net Proceeds}}{2}} = \frac{\left[12 + \frac{(100-97)}{10}\right]}{\frac{(100+97)}{2}} = 12.49\%$$

Note: Alternative approaches are available in respect of computation of Cost of Debt and Preference Capital.

3. Computation of Cost of Equity under Dividend Approach

$K_e = \frac{\text{Dividend per Share}}{\text{Market Price per Share}} + g \text{ (Growth Rate)} = \frac{₹2}{₹25 - ₹4} + 5\% = \mathbf{14.52\%}$.

Note: Floatation Cost of ₹ 4 is deducted in the Denominator and Net Issue Price is considered for K_e purposes.

Alternative Assumption: Floatation Cost may be ignored when computing K_e through Dividend-Growth Approach. K_e in such case = **13%**.

4. Computation of WACC based on Market Value Proportions

Item	Nos.	Mkt Price	Mkt Value	%	Cost	WACC
Debentures	$\frac{₹3,00,000}{₹100}$ = 3,000 Debentures	₹ 110	₹ 3,30,000	17.84%	K_d = 7.27%	1.30%
Preference Capital	$\frac{₹2,50,000}{₹100}$ = 2,500 Pref. Shares	₹ 108	₹ 2,70,000	14.59%	K_p = 12.49%	1.82%
Equity Capital	$\frac{₹5,00,000}{₹10}$ = 50,000 Equity Shares	₹ 25	₹ 12,50,000	67.57%	K_e = 14.52%	9.81%
			₹ 18,50,000	100.00%	K_o =	**12.93%**

Question 14

The following is the Capital Structure of RBT Limited as on 31st March 2016:

Source of Capital	Book Value	Market Value
Equity Shares at ₹ 10 each	₹ 50,00,000	₹ 1,05,00,000
Retained Earnings	₹ 13,00,000	Nil
11% Preference Shares at ₹ 100 each	₹ 7,00,000	₹ 9,00,000
14% Debentures	₹ 30,00,000	₹ 36,00,000

Market Price of Equity Shares is ₹ 40 per Share and it is expected that a Dividend of ₹ 4 per Share would be declared. The Dividend per Share is expected to grow at the rate of 8% every year. Income Tax Rate applicable to the Company is 40% and Shareholder's Personal Income Tax Rate is 20%.

You are required to calculate:

1. Cost of Capital for each source of Capital.

2. Weighted Average Cost of Capital on the basis of Book Value Weights.

3. Weighted Average Cost of Capital of on the basis of Market Value Weights.

Solution: 1. Computation of Individual Cost of Capital (Book Value based Computation)

Component & Formula	Computation	Cost
(a) $K_d = \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Face Value of Debt}}$	$\frac{(₹\ 30,00,000\ X\ 14\%)\ X\ (100\% - 40\%)}{₹\ 30,00,000}$	**8.40%**
(b) $K_p = \frac{\text{Preference Dividend}}{\text{Face Value of Pref .Capital}}$	$\frac{₹\ 7,00,000X11\%}{₹\ 7,00,000}$	**11.00%**
(c) $K_e = \frac{DPS_1}{MPS_0} + g$	$\frac{₹\ 4\ X108\%}{₹\ 40} + 8\% = 10.80\% + 8\%$	**18.80%**

2. Computation of Individual Cost of Capital (Market Value based Computation)

Component & Formula	Computation	Cost
(a) $K_d = \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Market Value of Debt}}$	$\frac{(₹\ 30,00,000\ X\ 14\%)\ X\ (100\% - 40\%)}{₹\ 36,00,000}$	**7.00%**
(b) $K_p = \frac{\text{Preference Dividend}}{\text{Market Value of Pref .Capital}}$	$\frac{₹\ 7,00,000X11\%}{₹\ 9,00,000}$	**8.56%**
(c) $K_e = \frac{DPS_1}{MPS_0} + g$	$\frac{₹\ 4\ X108\%}{₹\ 40} + 8\% = 10.80\% + 8\%$	**18.80%**

3. Computation of WACC based on Book Value Proportions

Component	Amount	Proportion	Individual Cost (WN 1)	WACC
Debentures	₹ 30 Lakhs	30%	8.40%	2.52%
Preference Shares	₹ 7 Lakhs	7%	11.00%	0.77%
Equity Capital	₹ 50 Lakhs	50%	18.80%	9.40%
Retained Earnings	₹ 13 Lakhs	13%	18.80%	2.44%
Total	**₹ 100 Lakhs**	**100%**		**15.53%**

4. Computation of WACC based on Market Value Proportions

Component	Amount	Proportion	Individual Cost (WN 2)	WACC
Equity	₹ 105 Lakhs	70%	18.80%	13.16%
Preference Shares	₹ 9 Lakhs	6%	8.56%	0.51%
Debentures	₹ 36 Lakhs	24%	7.0%	1.68%
Total	**₹ 150 Lakhs**	**100%**		**15.35%**

Note: Alternative Assumption / Treatment:

• In all the computations above, the Shareholders' Personal Income Tax Rate of 20% has not been considered, since it is assumed that Dividends are not taxable in his hands. Alternatively, **Post Tax Opportunity Costs** may be considered

for computing Cost of Retained Earnings as K_e (1 - t_p).

• However, if Dividend is considered taxable, the Cost of Equity shall be re-computed for after-tax effect, as under -

$K_e = \frac{DPS_1}{MPS_0} + g = \frac{(₹\ 100 \times 25\%) \times 105\% \times (100\% - 20\%)}{₹\ 200} + 5\% = 10.5\% + 5\% = \mathbf{15.5\%}$

• Also, instead of adjusting «e as above, K_r may be re-computed while using Book Value Weights as **Post Tax Opportunity Cost** = K_e (1 - t_p) = 18.80% × (100%- 20%) = **15.04%**

Question 15

The X Company has the following Capital Structure at 31st March 2018, which is considered to be optimum.

14% Debentures	**₹ 3,00,000**
11% Preference Shares	**₹ 1,00,000**
Equity (1,00,000 Shares)	**₹ 16,00,000**
Total	**₹ 20,00,000**

The Company's Share has a current Market Price of ₹ 23.60 per Share. The expected Dividend per Share next year is 50% of 2018 EPS. The following are the Earning Per Share figure for the Company during preceding ten year The past trends are expected to continue.

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EPS (₹)	1.00	1.10	1.21	1.33	1.46	1.61	1.82	1.95	2.16	2.36

The Company issued new Debentures carrying 16% Rate of Interest and the Current Market Price of Debenture is ₹ 96. Preference Share ₹ 9.20 (which Dividend of ₹ 1.1 per Share) were also issued. The Company is in 50% tax bracket.

1. Calculate After-Tax Cost of (a) New Debt, (b) New Preference Share (c) New Equity Share (assuming New Equity from Retained Earning)

2. Calculate Marginal Cost of Capital when no New Shares was issued.

3. How much can be spent for Capital Investment before New Ordinary Shares must be sold? Assuming the Retained Earning for next year's investment are 50% of 2018.

4. What will be the Marginal Cost of Capital when the funds exceeds the amount calculated in (iii), assuming New Equity is issued at ₹ 20 per Share?

Solution: 1. Computation of Cost of Additional Capital (component wise)

1. (a) After Tax Cost of New Debt $K_d = \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Net Proceeds of Issue}} = \frac{16 \times (100\% - 50\%)}{96} = \mathbf{8.33\%}$ **(Note 1)**

1. (b) After Tax Cost of New Preference Share Capital $\mathbf{K_p} = \frac{\text{Preference Dividend}}{\text{Net Proceeds of Issue}} = \frac{1.10}{9.20} = \mathbf{11.96\%}$

1. (c) After Tax Cost of Ordinary Equity $K_e = \frac{DPS}{MPS} + g = \frac{50\% \text{ X } 2.36}{23.60} + 10\% - \mathbf{15\%}$ **(Note 2)**

Notes:

1. It is assumed that Current Market Price of **New Debentures** is ₹ 96 (with Face Value ₹ 100). Alternatively, if it is assumed that Market Price of Existing 14% Debentures is ₹ 96, then, the Company can sell New 16% Debentures at $\frac{₹\ 96}{14\%} \times 16\%$ = ₹ 109.70. Then, the After Tax Cost of Debt = 7.29% and other figures will get modified accordingly.

2. **"g"** i.e. Growth Rate under Realised Yield Method = Past Average Growth Rate = **10%,** in the following manner -

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
EPS (₹)	1.00	1.10	1.21	1.33	1.46	1.61	1.82	1.95	2.15	2.36
Additional EPS	—	0.10	0.11	0.12	0.13	0.15	0.21	0.13	0.20	0.21
% increase in EPS	—	10.00%	10.00%	9.91%	9.77%	10.27%	13.04%	7.14%	10.25%	9.76%

% Increase in EPS = $\frac{\text{Additional EPS}}{\text{Previous Year EPS}}$, e.g. $\frac{0.10}{1.00}$, etc. An Average of **10% Growth Rate** is considered.

2. **Marginal Cost of Capital:** Since the present Capital Structure is optimum (Refer 1st sentence in the question), the additional funds will be raised in the same ratio in order to maintain the capital structure. Hence, the Marginal Cost of Capital is **13.85%,** computed as under:

Component	₹	%	Individual Cost	WACC
Debt	3,00,000	15%	K_d = 8.33%	1.25%
Preference Capital	1,00,000	5%	K_p = 12.00%	0.60%
Equity Capital	16,00,000	80%	K_e = 15.00%	12.00%
Total	**20,00,000**	**100%**	**WACC** = K_o =	**13.85%**

3. **Retained Earnings available for further investments** = 50% of 2018 EPS

= 50% × ₹ 2.36 × 1,00,000 Shares = ₹ **1,18,000**

Hence, amount to be used by way of Retained Earnings, before selling New Ordinary Shares = ₹ 1,18,000.

As Equity = 80% of Total Funds, the Total Capital before issuing fresh Equity Shares = $\frac{1,18,000}{80\%}$ = ₹ **1,47,500**

4. **Revised Marginal Cost of Capital** if the Company spends in excess of ₹ 1,47,500 it will have to issue New Shares:

Note: Revised Cost of Ordinary Equity $K_e = \frac{DPS}{MPS} + g = \frac{1.18}{20} + 10\% = 15.9\%$

Component	₹	%	Individual Cost	WACC
Debt	3,00,000	15%	K_d = 8.33%	1.25%
Preference Capital	1,00,000	5%	K_p = 12.00%	0.60%
Equity Capital	16,00,000	80%	K_e = 15.90%	12.72%
Total	**20,00,000**	**100%**	**WACC** = K_o =	**14.57%**

Question 16

ABC Limited has the following Book Value Capital Structure -

Equity Share Capital (150 Million Shares ₹ 10 par)	₹ 1,500 million
Reserves & Surplus	₹ 2,250 million
10.5% Preference Share Capital (1 Million Shares ₹ 100 par)	₹ 100 million
9.5% Debentures (1.5 Million Debentures ₹ 1,000 par)	₹ 1,500 million
8.5% Term Loans from Financial Institutions	₹ 500 million

The Debentures of ABC Limited are redeemable after three years and are quoting at ₹ 981.05 per Debenture. The applicable Income Tax Rate for the Company is 35%.

The Current Market Price per Equity Share is ₹ 60. The prevailing default Risk Free Interest Rate on 10 year GOI Treasury Bonds is 5.5%. The average Market Risk Premium is 8%. The Beta of the Company is 1.1875.

The Preferred Stock of the Company is redeemable after 5 years and is currently selling at ₹ 98.15 per Preference Share.

1. Calculate the Weighted Average Cost of Capital of the Company using Market Value Weights.

2. Define the Marginal Cost of Capital Schedule for the Firm, if it raises ₹ 750 million for a new project. The Firm plans to have a target Debt to Value ratio of 20%. The Beta of the new project is 1.4375. The Debt Capital will be raised through Term Loans. It will carry an interest rate of 9.5% for the first ₹ 100 Million and 10% for the next ₹ 50 Million.

Solution:

1. K_e = Risk Free Rate + Risk Premium = Risk Free Rate + (Beta × Average Market Risk Premium)

= 5.5% + (1.1875 × 8%) = 5.5% + 9.5% = **15.00%**

2. **K_p(Cost of Preference Share Capital)** is computed using two alternative approaches as under -

(a) **Irredeemable Preference Capital:** $K_p = \frac{\text{Preference Dividend}}{\text{Market Value of PSC}} = \frac{₹10.50}{₹98.15}$ = **10.70%.**

(b) **Redeemable Preference Capital:**

$$98.15 = \frac{10.5}{(1+\text{YTM})^1} + \frac{10.5}{(1+\text{YTM})^2} + \frac{10.5}{(1+\text{YTM})^3} + \frac{10.5}{(1+\text{YTM})^4} + \frac{110.5}{(1+\text{YTM})^5}$$

Where YTN = Yield to Maturity. On solving, we get YTM = 110/0 (approximately). So, $K_p = 11\%$.

AItematively,

$$K_p = \frac{\text{Preference Dividend} + \frac{\text{Re demption Value} - \text{Net Proceeds}}{\text{Number of years}}}{\frac{\text{Re detion Value} + \text{Net Proceeds}}{2}} = \frac{[10.50 + \frac{(100-98.15)}{5}]}{\frac{(100+98.15)}{2}} = 10.97\%$$

3. K_d (Cost of Debentures) Is computed using two alternative approaches as under-

(a) Irredeemable Debt $K_d = \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Market Value of Debt}} = \frac{(1.5 \times ₹\,1{,}000 \times 9.5\%) \times (100\%\ 35\%)}{(₹\ 981.05 \times 1.5)} = 6.29\%$

(b) Redeemable Debt: (Note: YTM = Yield to Maturity) $981.05 = \frac{95}{(1+\text{YTM})^1} + \frac{95}{(1+\text{YTM})^2} + \frac{1{,}095}{(1+\text{YTM})^3}$

On solving, we get YTM = 10% (approximately). So, K_d = YTM × (100% - Tax) = 10% × 65% = 6.5%.

Alternatively,

$$K_d = \frac{\text{Interest}(100-\text{Tax}) + \frac{\text{Re demtion Value} - \text{Net Proceeds}}{\text{Number of years}}}{\frac{\text{Re detion value} + \text{Net Proceeds}}{2}} = \frac{[(95 \times 65\%) + \frac{(1{,}000-981.05)}{3}]}{\frac{(1{,}000+981.05)}{2}} = 6.87\%$$

4. K_d (Cost of Term Loans) $= \frac{\text{Interest} \times (100\% - \text{Tax Rate})}{\text{Market Value of Debt}} = \frac{(1{,}500 \times 8.5\%) - (100\% - 3\%)}{500} = 5.525\%$

5. (a) Computation of Individual Cost of Capital and WACC

Type of Capital	Market Value in ₹ Millions	Ratio	Indl. Cost	WACC
Equity Share Capital	150 × 60 = 9,000.000	81.30%	15.00%	12.20%
10.5% Preference Share Capital	1 × 98.15 = 98.150	0.89%	10.70%	0.09%
9.5% Debentures	1.5 × 981.05 = 1,471.575	13.30%	6.29%	0.84%
8.5% Term Loan from Financial Institution	Given 500.000	4.51%	5.53%	0.25%
Total	**11,069.725**	**100.00%**		**13.38%**

Note: Reserves & Surplus are included in Market Value of Equity Share Capital, hence not applicable for WACC computation.

5. (b) Computation of Individual Cost of Capital and WACC (using YTM calculations)

Type of Capital	Market Value in ₹ Millions	Ratio	Indl. Cost	WACC
Equity Share Capital	150 × 60 = 9,000.000	81.30%	15.00%	12.20%
10.5% Preference Share Capital	1 × 98.15 = 98.150	0.89%	11.00%	0.09%
9.5% Debentures	1.5 × 981.05 = 1,471.575	13.30%	6.50%	0.86%
8.5% Term Loan from Financial Institution	Given 500.000	4.51%	5.53%	0.25%
Total	**11,069.725**	**100%**		**13.40%**

Note: Reserves & Surplus are included in Market Value of Equity Share Capital, hence not applicable for WACC computation.

6. Marginal WACC: Total Amount to be raised = ₹ 750 Million, of which Debt should be 20%, i.e. ₹ 150 Millions and Equity 80%, being ₹ 600 Millions. Since cost of debt changes after ₹ 100 Millions, the Marginal WACC is computed in the following segments -

Particulars	Debt	Equity	Individual Cost	Marginal WACC K_o =
First ₹ 500 Millions	100 Millions	400 Millions	K_d = 9.5% × (100% - 35%) = 6.175% K_e = 5.5% + (8% × 1.4375) = 17%	(6.175% × 20%) + (17% × 80%) = **12.365%**
Next ₹ 250 Millions	50 Millions	200 Millions	K_d = 10% × (100% - 35%) = 6.5% K_e = 5.5% + (8% × 1.4375) = 17%	(6.5% × 20%) + (17% × 80%) = **14.90%**

Question 17

India Limited requires ₹ 50,00,000 for a New Plant. This Plant is expected to yield Earnings before Interest and Taxes of ₹10,00,000. While deciding about the Financial Plan, the Company considers the objective of maximizing Earnings per Share. It has 3 alternatives to finance the Project - by raising Debt of ₹ 5,00,000 or ₹ 20,00,000 or ₹ 30,00,000 and the balance in each case, by issuing Equity Shares. The Company's Share is currently selling at ₹ 150, but it is

expected to decline to ₹ 125 in case the funds are borrowed in excess of ₹ 20,00,000. The Funds can be borrowed at the rate of 9% upto ₹ 5,00,000, at 14% over ₹5,00,000 and upto ₹ 20,00,000 and at 19% over ₹ 20,00,000. The Tax rate applicable to the Company is 40%. Which form of financing should the Company choose? Show EPS Amount upto two decimal points.

Solution: Statement showing EPS under the different schemes

Particulars	Scheme I	Scheme II	Scheme III
> Capital Required	₹ 50,00,000	₹ 50,00,000	₹ 50,00,000
Less: Debt Content	₹ 5,00,000	₹ 20,00,000	₹ 30,00,000
Balance Equity Capital required	**₹ 45,00,000**	**₹ 30,00,000**	**₹ 20,00,000**
Market Price per Share	₹ 150	₹ 150	₹ 125
Number of Equity Shares to be issued = $\frac{\text{Equity Capital}}{\text{Issue Price,i.e.MPS}}$	30,000 Shares	20,000 Shares	16,000 Shares
EBIT (given)	₹ 10,00,000	₹ 10,00,000	₹ 10,00,000
Less: Interest on Debt Upto ₹ 5,00,000 at 9%	₹ 45,000	₹ 45,000	₹ 45,000
Over ₹ 5,00,000 upto ₹ 20,00,000 at 14% (₹ 15,00,000 × 14%)	-	₹ 2,10,000	₹ 2,10,000
Over ₹ 20,00,000 at 19% (₹10,00,000 × 19%)	-	-	₹ 1,90,000
Total Interest Cost	₹ 45,000	₹ 2,55,000	₹ 4,45,000
EBT	₹ 9,55,000	₹ 7,45,000	₹ 5,55,000
Less: Tax at 40%	₹ 3,82,000	₹ 2,98,000	₹ 2,22,000
EAT	**₹ 5,73,000**	**₹ 4,47,000**	**₹ 3,33,000**
EPS = $\frac{\text{EAT}}{\text{No.of Equity Shares}}$	**₹ 19.10**	**₹ 22.35**	**₹ 20.81**

Conclusion: EPS is maximum under Scheme II and is hence preferable.

Question 18

J Ltd wants is considering 3 financing plans. The key information is as follows -

1. Total Investment to be raised ₹ 4,00,000.

2. Plans showing the Financing Proportion:

Plans	% of Equity	% of Debt	% of Preference Shares
X	100	-	-
Y	50	50	-
Z	50	-	50

3. Cost of Debt -10%, Cost of Preference Shares -10%

4. Tax Rate - 50%

5. Equity Shares of the Face Value of ₹ 10 each will be issued at a Premium of ₹ 10 per Share.

6. Expected Earnings Before Interest and Tax ₹ 1,00,000.

Compute the following for each Plan - (1) Earnings Per Share, (2) Financial Break-Even-Point, and (3) Indifference Point among the Plans, and indicate if any of the plans dominate.

Solution: 1. Computation of EPS with given EBIT of ₹ 1,00,000 and 2. Financial BEP

	Particulars	Plan X	Plan Y	Plan Z
	Capital Required	₹ 4,00,000	₹ 4,00,000	₹ 4,00,000
Less:	Debt Component	Nil	(50%) ₹ 2,00,000	Nil
	Preference Share Capital	Nil	Nil	(50%) ₹ 2,00,000
	Balance Equity Capital required	**₹ 4,00,000**	**₹ 2,00,000**	**₹ 2,00,000**
	Issue Price per Share	₹ 20	₹ 20	₹ 20
	Number of Equity Shares to be issued = $\frac{\text{Equity Capital}}{\text{Issue Price}}$	20,000 Shares	10,000 Shares	10,000 Shares
Less:	EBIT (given)	₹ 1,00,000	₹ 1,00,000	₹ 1,00,000
	Interest (10% on Debt)	Nil	₹ 20,000	Nil
	EBT	₹ 1,00,000	₹ 80,000	₹ 1,00,000
Less:	Tax at 50%	₹ 50,000	₹ 40,000	₹ 50,000
	EAT	₹ 50,000	₹ 40,000	₹ 50,000
Less:	Preference Dividend (10% on PSC)	Nil	Nil	₹ 20,000
	Residual Earnings	**₹ 50,000**	**₹ 40,000**	**₹ 30,000**
	EPS = $\frac{\text{Residual Earnings}}{\text{No.of Equity Shares}}$	**₹ 2.50**	**₹ 4.00**	**₹ 3.00**
	Financial BEP is computed by the formula - **Required** EBIT = Interest + $\frac{\text{Preference Dividend}}{(100\% - \text{Tax Rate})}$	**Nil**	(Interest only) = **₹ 20,000**	$\frac{₹\ 20,000}{50\%}$ = **₹ 40,000**

3. Computation of EBIT - EPS Indifference Point

	Particulars	Plan X	Plan Y	Plan Z
	EBIT	E	E	E
Less:	Interest (10% on Debt)	Nil	₹ 20,000	Nil

	EBT	E	E - 20,000	E
Less:	Tax at 50%	0.5 E	0.5 E - 10,000	0.5 E
	EAT	0.5 E	0.5 E - 10,000	0.5 E
Less:	Preference Dividend (10% on PSC)	Nil	Nil	₹ 20,000
	Residual Earnings	**0.5 E**	**0.5 E - 10,000**	**0.5 E - 20,000**
	No. of Equity Shares **(WN 1** above)	20,000 Shares	10,000 Shares	10,000 Shares
	EPS = $\frac{\text{Residual Earnings}}{\text{No.of Equity Shares}}$	$\frac{0.5E}{20,000 \text{ Shares}}$	$\frac{0.5E - 10,000}{10,000 \text{ Shares}}$	$\frac{0.5E - 20,000}{10,000 \text{ Shares}}$

For indifference between the above alternatives, EPS should be equal. Hence, Indifference Points are as under -

For Plans X & Y: $\frac{0.5E}{20,000} = \frac{0.5E - 10,000}{10,000}$. On simplification, 0.5 E = 1 E - 20,000. **So, E = 40,000**

For Plans Y & Z: $\frac{0.5E - 10,000}{10,000} = \frac{0.5\,E - 20,000}{10,000}$. Hence, there is no indifference point at all between Plans Y & Z.

For Plans Z & X: = $\frac{0.5E - 20,000}{10,000} = \frac{0.5E}{20,000}$. On simplification, IE- 40,000 = 0.5 E. **So, E = 80,000**

Note: Plan Y dominates Plan Z since Financial BEP of Plan Y is only ₹ 20,000 whereas for Plan Z it is ₹ 40,000.

Question 19

RM Steels Limited requires ₹ 10,00,000 for construction of a new plant. It is considering three financial plans:

1. The Company may issue 1,00,000 Ordinary Shares at ₹ 10 per Share,

2. The Company may issue 50,000 Ordinary Shares at ₹ 10 per Share and 5,000 Debentures of ₹ 100 denomination bearing a 8 per cent rate of Interest, and

3. The Company may issue 50,000 Ordinary Shares at ₹ 10 per Share and 5,000 Preference Shares at ₹ 100 per Share bearing a 8 per cent rate of Dividend.

If RM Steels Limited's Earnings before Interest and Taxes are ₹ 20,000, ₹ 40,000, ₹ 80,000, ₹ 1,20,000 and ₹ 2,00,000, you are required to compute the Earnings per Share under each of the three Financial Plans. Which alternative would you recommend for RM Steels and why? Tax Rate is 50%.

Solution: 1. Profitability Statement under different Plans

Plan I: Issue of 1,00,000 Equity Shares at ₹ 10

	Situation	A	B	C	D	E
	EBIT	₹ 20,000	₹ 40,000	₹ 80,000	₹ 1,20,000	₹ 2,00,000
Less:	Interest on Debentures	Nil	Nil	Nil	Nil	Nil

	EBT	₹ 20,000	₹ 40,000	₹ 80,000	₹ 1,20,000	₹ 2,00,000
Less:	Tax at 50%	₹ 10,000	₹ 20,000	₹ 40,000	₹ 60,000	₹ 1,00,000
	EAT	₹ 10,000	₹ 20,000	₹ 40,000	₹ 60,000	₹ 1,00,000
Less:	Preference Dividend	Nil	Nil	Nil	Nil	Nil
	Residual Earnings	**₹ 10,000**	**₹ 20,000**	**₹ 40,000**	**₹ 60,000**	**₹ 1,00,000**
	Number of Equity Shares	1,00,000	1,00,000	1,00,000	1,00,000	1,00,000
EPS =	$\frac{\text{Residual Earnings}}{\text{No.of Equity Shares}}$	**₹ 0.10**	**₹ 0.20**	**₹ 0.40**	**₹ 0.60**	**₹ 1.00**

Plan II: Issue of 50,000 Equity Shares at ₹ 10 and 5,000 8% Debentures of ₹ 100

	Situation	**A**	**B**	**C**	**D**	**E**
	EBIT	₹ 20,000	₹ 40,000	₹ 80,000	₹ 1,20,000	₹ 2,00,000
Less:	Interest on Debentures	₹ 40,000	₹ 40,000	₹ 40,000	₹ 40,000	₹ 40,000
	EBT	₹ (20,000)	Nil	₹ 40,000	₹ 80,000	₹ 1,60,000
Less:	Tax at 50% **(See Note)**	₹ (10,000)	Nil	₹ 20,000	₹ 40,000	₹ 80,000
	EAT	₹ (10,000)	Nil	₹ 20,000	₹ 40,000	₹ 80,000
Less:	Preference Dividend	Nil	Nil	Nil	Nil	Nil
	Residual Earnings	**₹ (10,000)**	**Nil**	**₹ 20,000**	**₹ 40,000**	**₹ 80,000**
	Number of Equity Shares	50,000	50,000	50,000	50,000	50,000
EPS =	$\frac{\text{Residual Earnings}}{\text{No.of Equity Shares}}$	**₹ (0.20)**	**Nil**	**₹ 0.40**	**₹ 0.80**	**₹ 1.60**

Note: In Situation A, Tax is saved on account of Loss during the period. Hence, net EAT is calculated, after setting off tax savings. Further, EPS should be reported, irrespective of its sign, i.e. -ve or +ve.

Plan III: Issue of 50,000 Equity Shares at ₹ 10 and 5,000 8% Preference Shares of ₹ 100

	Situation	**A**	**B**	**C**	**D**	**E**
	EBIT	₹ 20,000	₹ 40,000	₹ 80,000	₹ 1,20,000	₹ 2,00,000
Less:	Interest on Debentures	Nil	Nil	Nil	Nil	Nil
	EBT	₹ 20,000	₹ 40,000	₹ 80,000	₹ 1,20,000	₹ 2,00,000
Less:	Tax at 50%	₹ 10,000	₹ 20,000	₹ 40,000	₹ 60,000	₹ 1,00,000
	EAT	₹ 10,000	₹ 20,000	₹ 40,000	₹ 60,000	₹ 1,00,000

Less: Preference Dividend **(Note)**	Nil	Nil	₹ 40,000	₹ 40,000	₹ 40,000
Residual Earnings	**₹ 10,000**	**₹ 20,000**	**₹ Nil**	**₹ 20,000**	**₹ 60,000**
Number of Equity Shares	50,000	50,000	50,000	50,000	50,000
EPS = $\frac{\text{Residual Earnings.}}{\text{No.of Equity Shares}}$ **(Note)**	**Nil**	**Nil**	**Nil**	**₹ 0.40**	**₹ 1.20**

Note: In Plan III above, Preference Dividend is ₹ 40,000 whereas EAT is insufficient to meet this liability in situations A and B. Hence, EPS for Equity Shareholders = Nil, since the Preference Shareholders are entitled to first priority in the declaration of dividends, and the Residual Income is relevant for calculating EPS.

Note: Alternatively, Preference Dividend may also be debited in full under Plan III, wherever EAT is positive.

2. **Recommendation:** In order to maximize EPS, the optimal financing plan will be as under -

Situation	**A**	**B**	**C**	**D**	**E**
EBIT	₹ 20,000	₹ 40,000	₹ 80,000	₹ 1,20,000	₹ 2,00,000
Financing Plan to be selected	I	I	I or II	II	II
Maximum EPS	**₹ 0.10**	**₹ 0.20**	**₹ 0.40**	**₹ 0.80**	**₹ 1.60**

Alternatively, the reasoning / recommendation can be as under -

(a) Debenture Interest = 8% and Preference Dividend = 8%. These are fixed commitments / outflows for the Company.

(b) Total Capital to be employed under all three financing plans = ₹ 10,00,000. The minimum return to be obtained in order to meet the fixed commitments = 8% of ₹ 10,00,000 = ₹ 80,000.

(c) When EBIT < ₹ 80,000, the Company should resort to Plan I (i.e. 100% Equity financing), since borrowing Debt and / or raising Preference Capital, is not justified in that case.

(d) When EBIT > ₹ 80,000, the Company should opt for Plan II (Debt and Equity financing), since Debt has a lower effective cost than Preference Capital, and Financial Leverage will be favourable in that case.

Question 20

A Ltd and B Ltd are identical except for capital structures. A Ltd has 60% Debt and 40% Equity, whereas B Ltd has 20% Debt and 80% Equity. (All percentages are in market-value terms.) The Borrowing Rate for both Companies is 8% in a no-tax world, and capital markets are assumed to be perfect.

(a) (i) If X owns 3% of the Equity Shares of A Ltd, determine his Return if the Company has Net Operating Income of ₹ 4,50,000 and the Overall Capitalization Rate of the Company (K_o) is 18%.

(ii) Calculate the Implied Required Rate of Return on Equity of A Ltd.

(b) B Ltd has the same Net Operating Income as A Ltd.

(i) Calculate the Implied Required Return of B Ltd.

(ii) Analyse why does it differ from that of A Ltd.

Solution: Note: Net Operating Income Approach (with Constant K_o) is applicable in this case, since (a) Companies are identical, (b) Capital Markets are perfect, (c) no tax.

Particulars	A Ltd (₹)	B Ltd (₹)
1. Value of Firm (F) = $\frac{EBIT}{K_o}$	$\frac{4,50,000}{18\%}$ = 25,00,000	$\frac{4,50,000}{18\%}$ = 25,00,000
2. Value of Debt (D)	60% = 15,00,000	20% = 5,00,000
3. Value of Equity = F - D	10,00,000	20,00,000
4. Net Operating Income = EBIT	4,50,000	4,50,000
5. Interest on Debt (8% on Debt in Item 2)	1,20,000	40,000
6. Net Income EBT for Equity Holders (4 - 5)	3,30,000	4,10,000
7. K_e = Implied Required Equity Return = $\frac{(6)}{(3)}$	33%	20.5%

Note:

1. Income to Shareholder X for 3% Stock in A Ltd = 3% of ₹ 3,30,000 = ₹ 9,900.

2. K_e of B Ltd is lower because B Ltd uses **lower** Debt in its Capital Structure. Linder the Net Operating Income approach, the decline in required Equity Return offsets exactly the disadvantage of not employing so much in the way of "cheaper" Debt Funds, thus overall K_o is Constant. Lower the Debt, lower the Return Expectations of Equity holders.

Question 21

The following data relate to two Companies belonging to the same risk class:

Particulars	A Ltd	B Ltd
Expected Net Operating Income	₹ 18,00,000	₹ 18,00,000
12% Debt	₹ 54,00,000	-
Equity Capitalization Rate	-	18%

Required:

(a) Determine the Total Market Value, Equity Capitalization Rate and Weighted Average Cost of Capital for each Company assuming no Taxes as per MM Approach.

(b) Determine the Total Market Value, Equity Capitalization Rate and Weighted Average Cost of Capital for each Company assuming 40% Taxes as per MM Approach.

Solution: 1. Computation of Earnings After Tax (₹)

Particulars	Case 1: No Taxes		Case 2: 40% Taxes	
	A Ltd	B Ltd	A Ltd	B Ltd

	EBIT	18,00,000	18,00,000	18,00,000	18,00,000
Less:	Interest (54,00,000 × 12%)	(6,48,000)	—	(6,48,000)	—
	EBT	11,52,000	18,00,000	11,52,000	18,00,000
Less:	Tax at 40%	—	—	(4,60,800)	(7,20,000)
	EAT	**11,52,000**	**18,00,000**	**6,91,200**	**10,80,000**

2. Computation of Cost of Equity & Debt (₹)

Particulars	**Case 1: No Taxes**	**Case 2: 40% Taxes**
(a) Value of Unlevered Firm **(B Ltd)** = $\frac{\text{EAT}}{\text{Capitalization Rate}}$	$\frac{18,00,000}{18\%}$ = 1,00,00,000	$\frac{10,80,000}{18\%}$ = 60,00,000
(b) Value of Levered Firm **(A Ltd)** (As per MM Approach)	Value of Unlevered Firm = 1,00,00,000	Value of Unlevered Firm + (Debt x Tax) = 60,00,000 + (54,00,000 × 40%)=81,60,000
(c) Value of Debt	(54,00,000)	(54,00,000)
(d) Value of Equity = (b) - (c)	46,00,000	27,60,000
(e) Earnings attributable to Equity Shareholders = EAT	11,52,000	6,91,200
(f) Cost of Equity = $\frac{\text{EAT}}{\text{Value of Equity}} = \frac{(e)}{(d)}$	25.05%	25.05%
(g) Cost of Debt = Interest × (100% - 40%)	12%	12% × (100% - 40%) =7.2%

3. Computation of Weighted Average Cost of Capital (₹)

Case 1: No Taxes	**Case 2: 40% Taxes**
$K_o = (K_d \times W_d) + (K_e \times W_e)$	$K_o = (K_d \times W_d) + (K_e \times W_e)$
$12\% \times \frac{54,00,000}{1,00,00,000} + 25.05\% \times \frac{46,00,000}{1,00,00,000} = 18\%$	$7.2\% \times \frac{54,00,000}{81,60,000} + 25.05\% \times \frac{27,60,000}{81,60,000} = 13.24\%$

DIVIDEND

Question 22

Rishab Ltd has just paid out ₹ 5 as Dividend to its Shareholder₹ The past dividend trend of the Company indicates that the dividend outgo increases by 10% p.a. The Company foresees this growth rate for the next 2 years, after which the dividend outgo will increase by 12% p.a. for 3 years and thereafter, 12.50% for 2 years After that point in time it is expected that annual increase in dividend will be fixed at 11% p.a.

If the expected rate of return is 17.50% p.a, ascertain the Theoretical Market Price of the

Share, assuming Dividend Outgo is the sole determinant of the Market Value.

Solution: Computation of Market Price per Share = PV of Inflows

Year	Nature	Cash Flow	PVF @ 17.50%	DCF
1	Dividend	₹ 5 + 10% = 5.500	0.8511	4.6811
2	Dividend	₹ 5.500 + 10% = 6.050	0.7243	4.3820
3	Dividend	₹ 6.050 + 12% = 6.776	0.6164	4.1767
4	Dividend	₹ 6.776 + 12% = 7.589	0.5246	3.9812
5	Dividend	₹ 7.589 + 12% = 8.500	0.4465	3.7953
6	Dividend	₹ 8.500 + 12.50% = 9.562	0.3800	3.6336
7	Dividend	₹ 9.562 + 12.50% = 10.758	0.3234	3.4791
7	MP at end of $Y_7 = \frac{D_8}{K_e - g}$	$\frac{₹\ 10.758 \times (1.11)}{17.50\% - 11\%}$ = 183.71	0.3234	59.4118
	Market Price			₹ 87.5408

Market Price of Rishab Ltd's Shares should be ₹ 87.5408.

Question 23

The following information is taken from ABC Ltd.

Net Profit for the year	₹ 30,00,000	Internal Rate of Return on Investment	22%
12% Preference Share Capital	₹ 1,00,00,000	Cost of Equity Capital	18%
Equity Share Capital (Share of ₹ 10 each)	₹ 60,00,000	Retention Ratio	75%

Calculate the Market Price of the Share using - (1) Gordon's Model, (2) Walter's Model.

Solution:

- Assuming Net Profit is before Preference Dividend, Residual Earnings Available to Equity Holders = EAT - Preference Dividend = ₹ 30 Lakhs less (₹ 100 Lakhs × 12%) = ₹ 18 Lakhs.
- Number of Equity Shares = $\frac{₹\ 60\ Lakhs}{₹\ 10\ per\ Share}$ = 6 Lakh Shares. So, EPS (E) = $\frac{₹\ 18\ Lakhs}{3\ Lakh\ Shares}$ = **₹3.**
- Dividend Per Share (D) = ₹ 3 × (100% - 75% Retention) = ₹ 0.75

1. Value Per Share under Walter's Model $(P_0) = \frac{D+(E-D)\frac{r}{K_e}}{K_e} = \frac{0.75+(3-0.75)\times\frac{0.22}{0.18}}{0.18} = ₹19.44$

2. Value Per Share under Gordon's Model

(a) Growth Rate (g) = Retention Ratio (b) × ROI (r) = 75% × 22% = **16.5%**

(b) Value per Share (P_0) = $\frac{D_1}{k_e - g} = \frac{₹0.75 \times 116.5\%}{(0.18 - 0.165)} = ₹58.25$

Question 24

Vashishta Ltd was started a year back with Equity Capital of ₹ 40 Lakhs. The other details are as under:

Earnings of the Company	**₹ 4,00,000**	**Price Earnings Ratio**	**12.5**
Dividend paid	**₹ 3,20,000**	**Number of Shares**	**40,000**

Find Current Market Price of Share. Find whether the Company's D/P Ratio is optimal, use Walter's Formula.

Solution: 1. Rules for Optimal Dividend Policy as per Walter's Formula

1. Evaluation of Company's Present Dividend Policy

(a) Present Return on Investment = $\frac{\text{Earnings}}{\text{Equity Capital}}$ $\frac{4,00,000}{(40,000 \text{ Shares} \times 100)}$ = 10%

(b) Present K_e= $\frac{1}{\text{PE Ratio}} = \frac{1}{12.5}$ = 8%

(c) Since R > K_e, Company is a Growth Firm, and Optimal Dividend Payout is "Zero".

(d) Since the Company has Dividend Payout, i.e. $\frac{3,20,000}{4,00,000}$ = 80%, it is **not** following the Optimal Policy.

2. Market Price of Share (Walter's Model)

Earnings Per Share (E)	₹4,00,000 ÷ 40,000 = ₹10	Cost of Equity (K_e)	8%
Dividend Per Share (D)	EPS ₹10 × Payout 80% = ₹8	Return on Investment (r)	10%

Value per Share	**When Payout = Zero**	**When Payout = ₹ 8**
Value Per Share = $\frac{D + (E-D)\frac{r}{K_e}}{K_e}$	= $\frac{₹0 + (₹10 - ₹0) \times \frac{0.10}{0.08}}{0.08}$ = **₹156.25**	= $\frac{₹8 + (₹10 - ₹8) \times \frac{0.10}{0.08}}{0.08}$ = **₹ 131.25**

Question 25

The following figures are extracted from the Annual Report of RJ Ltd.

Net Profit	**₹ 50 Lakhs**
Outstanding 13% Preference Shares	**₹ 200 Lakhs**
Number of Equity Shares	**6 Lakhs**
Return on Investment	**25%**
Cost of Capital (K_e)	**15%**

Compute the approximate Dividend Payout Ratio by keeping the Share Price at ₹ 40 using the Walter's Model

Solution:

1. Residual Earnings = Net Profit - Preference Dividend = ₹ 50 Lakhs (-) ₹ 200 Lakhs × 13% = ₹ 24,00,000
2. Earnings Per Share (E) = $\frac{\text{Residual Earnings}}{\text{Number of Equity Shares}} = \frac{₹\ 24,00,000}{6,00,000}$ = **₹4**
3. To compute Dividend Payout Ratio, we require Dividend Per Share (DPS). Let Required Dividend Per Share be "D"
4. Using Walter's Formula, we have Price ₹ 40 = $\frac{D+(E-D)\frac{r}{K_e}}{K_e} \cdot \frac{₹D+(₹4-₹D)\times\frac{0.25}{0.15}}{0.15} = ₹40$ Solving, D + (4 - D) × $\frac{5}{3}$ = 40 × 15% = 6 Multiplying by 3, we have 3D + 20 - 5D = 18 So, **D = 1**
5. **Dividend Payout Ratio** at this level = $\frac{DPS}{EPS} = \frac{1}{4}$ = **25%**

Question 26

Implied Growth Rate and Return on Equity Calculate the Implied Growth Rate and Return on Equity if -

Current Stock Price = ₹ 65	**Capitalization Rate = 12%**
Next Year's Dividend = ₹ 4	**Earnings Retention Rate = 50%**

Solution:

1. Cost of Equity = $\frac{D_1}{P_0} + g$ So, 12% = $\frac{4}{65} + g$ So, Implied Growth Rate (g) = 12% - 6.15% = **5.85%**

2. Implied Return on Equity = $\frac{\text{Implied Growth Rate}}{\text{Earnings Retention Rate}} = \frac{5.85}{50}$ = **11.70%**

CAPITAL BUDGETING

Question 27

CK Ltd is planning to buy a new Machine, the details of which are as follows -

Cost of Machine at the commencement	**₹ 2,50,000**	**Estimated Annual Fixed Cost (excluding Depreciation)**	**₹ 1,00,000**
Economic Life of the Machine	**8 years**		
Residual Value	**Nil**	**Advertisement Expenses in 1st year in addition to annual Fixed Cost**	**₹ 20,000**
Annual Production Capacity of the Machine	**1,00,000 units**		
Estimated Selling Price per unit	**₹6**	**Maintenance Expenses in 5th year in addition to annual Fixed Cost**	**₹ 30,000**
Estimated Variable Cost per unit	**₹3**		

Cost of Capital is 12%. Ignore Tax. Analyse the proposal using the Net Present Value Method and advise.

Year	1	2	3	4	5	6	7	8
PVF at 12%	0.893	0.797	0.712	0.636	0.567	0.507	0.452	0.404

Solution:

(information in ₹)

1. Contribution per annum = (Sale Price ₹ 6 - Variable Cost ₹ 3) × 1,00,000 units	3,00,000
2. Fixed Cost Annual Given ₹ 1,00,000 + Depreciation $\frac{₹\ 2,50,000}{8\ \text{years}}$ = ₹ 31,250	1,31,250
3. Profit before Tax	1,68,750
4. Since Tax is ignored, Cash Flow after Tax per annum = PAT + Depreciation = 1,68,750 + 31,250	2,00,000
5. PV of CFAT for Year 1 -8 = 2,00,000 × (0.893+0.797+0.712+0.636+0.567+0.507+0.452+0.404)	9,93,600
6. PV of Advertisement Expenses in Year 1 = 20,000 × 0.893	(17,860)
7. PV of Maintenance Expenses in Year 5 = 30,000 × 0.567	(17,010)
8. PV of Initial Investment	(2,50,000)
9. Net Present Value = (6+7+8+9)	**7,08,730**

Advice: Since NPV of the proposal is positive, it is worthwhile.

Question 28

Alpha Ltd requires funds amounting to ₹ 80 Lakhs for its new project. To raise funds, the Company has following two alternatives:

(a) To issue Equity Shares (at par) amounting to ₹ 60 Lakhs and borrow the balance amount at the interest of 12% p.a. or

(b) To issue Equity Shares (at par) and 12% Debentures in equal proportion.

The Income-Tax Rate is 30%. Find out the point of indifference between the available two modes of financing and state which option will be beneficial in different situations.

Solution: Let the EBIT at the Indifference Point level be ₹ E **(amounts in ₹)**

Particulars	Alternative 1	Alternative 2
Description	ESC = ₹ 60 Lakhs, Debt=₹ 20 Lakhs	ESC = ₹ 40 Lakhs, Debt=₹ 40 Lakhs
EBIT	E	E
Less: Interest	₹ 20 Lakhs × 12% = 2,40,000	₹ 40 Lakhs × 12% = 4,80,000
EBT	E - 2,40,000	E - 4,80,000

Less: Tax at 30%	0.3E - 72,000	0.3E - 1,44,000
EAT = Residual Earnings for ESH	0.7E - 1,68,000	0.7E - 3,36,000
No. of Equity Shares (assuming FV ₹ 100)	60,000 Shares	40,000 Shares
EPS = $\frac{\text{Residual Earnings}}{\text{No.of Equity Shares}}$	$\frac{0.7E - 1,68,000}{60,000}$	$\frac{0.7E - 3,36,000}{40,000}$

For indifference between the above alternatives, EPS should be equal. So, $\frac{0.7E-1,68,000}{60,000} = \frac{0.7E-3,36,000}{40,000}$

Solving, **E = 9,60,000** So, for same EPS, required **EBIT = ₹ 9,60,000 EPS = ₹ 8.4 per Share.**

Beneficial Method in different situations:

Situation	Option to be chosen	Reason
EBIT below Indifference Point ₹ 9,60,000	Option 1 with lower debt (Interest Burden)	When ROCE and EBIT are low, a high DOL should be properly managed with low DFL, lower borrowings and interest burden.
EBIT equal to Indifference Point ₹ 9,60,000	Any alternative can be chosen.	Same EPS under both alternatives.
EBIT above Indifference Point ₹ 9,60,000	Option 2 with higher debt (Interest Burden)	When ROCE and EBIT are high, use of Debt funds is justified, and maximizes gain to Equity Shareholders by way of higher ROE and EPS. (This is called Leverage Effect or Gearing Effect).

Question 29

Given below are the data on a Capital Project 'M':		**You are required to calculate for this Project 'M'**
Annual Cost Saving	**₹ 60,000**	**1. Cost of Project**
Useful Life	**4 years**	**2. Payback Period**
Internal Rate of Return	**15%**	**3. Cost of Capital**
Profitability Index	**1.064**	**4. Net Present Value**
Salvage Value	**0**	**Given the following table of discount factors -**

Discount Factor	**15%**	**14%**	**13%**	**12%**
1 year	**0.869**	**0.877**	**0.885**	**0.893**

2 years	0.756	0.769	0.783	0.797
3 years	0.658	0.675	0.693	0.712
4 years	0.572	0.592	0.613	0.636

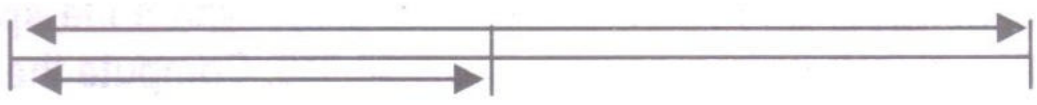
Solution:

1. Since IRR = 15%, Discounted Cash Inflows at 15% = Initial Investment in the Project.	₹ 1,71,300
So, Cost of Project = Initial Investment = CFAT p.a. x Cum. PVF at 15% for 4 years = ₹ 60,000 x 2.855	
2. Payback Period = $\frac{\text{Initial Investment}}{\text{CFAT per annum}} = \frac{₹\ 1,71,300}{₹\ 60,000}$ = **(See Note below)**	2.855 yrs
3. Profitability Index = $\frac{\text{Total DCFAT}}{\text{Initial Investment}}$ = 1.064 (given). So, Total DCFAT = PI x Initial Investment =	1.064 × 1,71,300 = ₹ 1,82,263
DCFAT = CFAT p.a. × PVF at K_o. On substitution, ₹ 1,82,263 = ₹ 60,000x PVF at	
On solving, PVF at $K_o = \frac{₹\ 1,82,263}{₹\ 60,000}$ = 3.038. From the above Table, K_o= 12%	K_o= 12%
4. NPV = Total DCFAT (WN 3) - Initial Investment (WN 1) = ₹ 1,82,263 - ₹ 1,71,300	₹ 10,963

Note: Discounted Payback Period can be computed as under -

Year	CFAT	PVF 12%	DCFAT 12%	Cum DCF 12%
1	60,000	0.877	52,620	52,620
2	60,000	0.769	46,140	98,760
3	60,000	0.675	40,500	1,39,260
4	60,000	0.592	35,520	1,74,780

Year 3 ₹ 35,520 for 12 months Year 4



₹ 1,39,260 ₹ 1,71,300 (Initial Invst) ₹ 1,74,780

Prop. Time for earning (1,71,300 -1,39,260) = ₹ 32,040

$\frac{₹\ 32,040}{₹\ 35,520}$ × 12 = 10.82 Mths. Disc.Payback Period= **3 yrs, 10.82 Months.**

Question 30

A Firm is willing to purchase a new machine and is having two options. Information related to the options are as follows:

	Option-I	Option-II
Cost of Machine	₹ 30,00,000	₹ 35,00,000
Expected Life	5 years	6 years
Salvage Value of Machine	₹ 5,00,000	₹ 5,00,000
Expected Earning (After tax)	₹ 7,75,000	₹ 8,25,000

The Firm charges depreciation on the Machine as per Straight Line Method. The Cost of Capital is 14%.

Required: Evaluate both the options on the basis of - (1) Discount Payback Period, (2) Net Present Value, (3) Profitability Index.

Solution: 1. Computation of CFAT from the Projects

Particulars	Option-I	Option-II
(a) Annual Earnings After Tax (and Depreciation)	₹7,75,000	₹8,25,000
(b) Depreciation = $\frac{\text{Cost of Machine} - \text{Salvage Value}}{\text{Number of years}}$	$\frac{₹\ (30-5)\ \text{Lakhs}}{5\ \text{years}}$ = ₹5,00,000	$\frac{₹\ (35-5)\ \text{Lakhs}}{6\ \text{years}}$ = ₹5,00,000
(c) **CFAT** = PAT + Depreciation = (a + b)	**₹12,75,000**	**₹13,25,000**

2. Computation of NPV (at 14% Cost of Capital) and Cumulative DCFAT

Year	PVF at 14%	Option-I			Option-II		
		CFAT	DCFAT	Cum DCFAT	CFAT	DCFAT	Cum DCFAT
1	0.877	12,75,000	11,18,175	11,18,175	13,25,000	11,62,025	11,62,025
2	0.769	12,75,000	9,80,475	20,98,650	13,25,000	10,18,925	21,80,950
3	0.675	12,75,000	8,60,625	29,59,275	13,25,000	8,94,375	30,75,325
4	0.592	12,75,000	7,54,800	37,14,075	13,25,000	7,84,400	38,59,725
5	0.519	17,75,000	9,21,225	46,35,300	13,25,000	6,87,675	45,47,400
6	0.455				18,25,000	8,30,375	53,77,775
	Total DCFAT		**46,35,300**			**53,77,775**	
Less:	Initial Investment		(30,00,000)			(35,00,000)	

Net Present Value	**16,35,300**			**18,77,775**	
PI = $\frac{\text{Total DCFAT}}{\text{Initial Investment}}$	**1.545**			**1.537**	

3. Discounted Payback Period (a) Option I

From Cumulative DCFAT Column, it is observed that Initial Investment is exceeded between Year 3 & Year 4. Hence, the Discounted Payback period is as under -

Year 3 ₹7,54,800 for 12 months Year 4

₹29,59,275 ₹30,00,000 ₹37,14,075

(Initial Investment)

Proportionate Time for earning (30,00,000 - 29,59,275)

= ₹40,725 = $\frac{₹\ 40,725}{₹\ 7,54,800}$ × 12 = 0.6 mths(approx.).

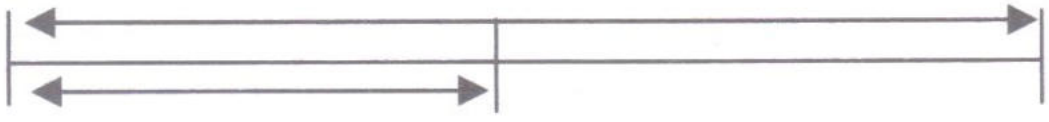
So, **Disc.Payback Period = 3 years, 0.6 mths.**

Alternatively, Discounted Payback Period can also be expressed as 3 + $\frac{₹\ 40,725}{₹\ 7,54,800}$ = **3.05 years.**

(b) Option II

From Cumulative DCFAT Column, it is observed that Initial Investment is exceeded between Year 3& Year 4. Hence, the Discounted Payback period is as under -

Year 3 ₹ 7,84,400 for 12 months Year 4



₹30,75,325 ₹ 35,00,000 ₹ 38,59,725

(Initial Investment)

Proportionate Time for earning (35,00,000 - 30,75,325)

= ₹4,24,675 = $\frac{₹\ 4,24,675}{₹\ 7,84,400}$ × 12 = 6.5 mths(approx.).

So, **Disc.Payback Period = 3 years, 6.5 mths.**

Alternatively, Discounted Payback Period can also be expressed as 3 + $\frac{₹\ 4,24,675}{₹\ 7,84,400}$ = **3.54 years.**

4. Project Evaluation

Particulars	**Option-I**	**Option-II**
(a) Rank based on NPV (Higher NPV is preferable)	2nd Rank	1st Rank

(b) Rank based on PI (Higher PI is preferable)	1st Rank	2nd Rank
(c) Rank based on Disc.Payback (Shorter Payback is preferable)	1st Rank	2nd Rank

Question 31

A Company wants to buy a Machine, and 2 different models A and B are available. Following further particulars are available:

Particulars	Machine-A	Machine - B
Original Cost (₹)	8,00,000	6,00,000
Estimated Life in years	4	4
Salvage Value (₹)	0	0

The Company provides Depreciation under Straight Line Method. Income Tax Rate applicable is 30%.

The Present Value of ₹ 1 at 12% Discounting Factor and Net Profit before Depreciation and Tax are as under:

Year	Net Profit Before Depreciation and Tax		PV Factor
	Machine-A ₹	Machine-B ₹	
1	2,30,000	1,75,000	0.893
2	2,40,000	2,60,000	0,797
3	2,20,000	3,20,000	0.712
4	5,60,000	1,50,000	0.636

Calculate: (1) NPV (Net Present Value), (2) Discounted Pay-Back Period, (3) PI (Profitability Index)

Suggest: Purchase of which Machine is more beneficial under Discounted Pay-Back Period, NPV and PI Methods.

Solution:

1. **Machine A: Note:** Depreciation = (Cost less Salvage Value) ÷ Years = (8,00,000 - Nil) ÷ 4 = ₹ 2,00,000

Year	Given PBDT	Deprn	PBT	Tax 30%	PAT	CFAT	PVF	DCFAT	Cum DCF
(1)	(2)	(3)	(4=2-3)	(5=4×0.3)	(6=4-5)	(7=6+3)	(8)	(9=7×8)	
1	2,30,000	2,00,000	30,000	9,000	21,000	2,21,000	0.893	1,97,353	1,97,353
2	2,40,000	2,00,000	40,000	12,000	28,000	2,28,000	0.797	1,81,716	3,79,069

3	2,20,000	2,00,000	20,000	6,000	14,000	2,14,000	0.712	1,52,368	5,31,437
4	5,60,000	2,00,000	3,60,000	1,08,000	2,52,000	4,52,000	0.636	2,87,472	8,18,909
								8,18,909	

2. Machine B: Note: Depreciation = (Cost less Salvage Value) ÷ Years = (6,00,000 - Nil) ÷ 4 = ₹ 1,50,000

Y	Given PBDT	Deprn	PBT	Tax 30%	PAT	CFAT	PVF	DCFAT	Cum DCF
(1)	(2)	(3)	(4=2-3)	(5=4×0.3)	(6=4-5)	(7=6+3)	(8)	(9=7×8)	
1	1,75,000	1,50,000	25,000	7,500	17,500	1,67,500	0.893	1,49,578	1,49,578
2	2,60,000	1,50,000	1,10,000	33,000	77,000	2,27,000	0.797	1,80,919	3,30,497
3	3,20,000	1,50,000	1,70,000	51,000	1,19,000	2,69,000	0.712	1,91,528	5,22,025
4	1,50,000	1,50,000	0	0	0	1,50,000	0.636	95,400	6,17,425
								6,17,425	

3. Discounted Payback Period Machine A

From Cumulative DCFAT Column, it is observed that Initial Investment is exceeded between Year 3 & Year 4. Hence, the Discounted Payback period is as under -

Year 3 ₹2,87,472 for 12 months Year 4

₹5,31,437 ₹8,00,000 ₹8,18,909

(Initial Investment)

Proportionate Time for earning (8,00,000 - 5,31,437)

= ₹2,68,563 = $\frac{₹\ 2,68,563}{₹\ 2,87,472}$ × 12 = **11.21** mths(approx-).

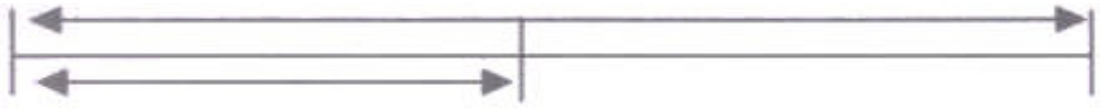
So, **Disc.Payback Period = 3 years, 11.21 months.**

Alternatively, Discounted Payback Period can also be expressed as 3 + $\frac{₹\ 2,68,563}{₹\ 2,87,472}$ = **3.93 years.**

(b) Machine B

From Cumulative DCFAT Column, it is observed that Initial Investment is exceeded between Year 3& Year 4. Hence, the Discounted Payback period is as under -

Year 3 ₹ 95,400 for 12 months Year 4



₹ 5,22,025 ₹ 6,00,000 ₹ 6,17,425

(Initial Investment)

Proportionate Time for earning (6,00,000 - 5,22,025)

= ₹ 77,975 = $\frac{₹\ 77,975}{₹\ 95,400}$ × 12 = **9.81** mths(approx·).

So, **Disc.Payback Period = 3 years, 9.81 months.**

Alternatively, Discounted Payback Period can also be expressed as 3 + $\frac{₹\ 77,975}{₹\ 95,400}$ = **3.82 years.**

4.Summary of Indicators

Particulars	Machine A	Machine B	Preference
NPV = Total DCFAT less Initial Invt (Higher NPV is preferable)	8,18,909 - 8,00,000 = **18,909**	6,17,425- 6,00,000 = **17,425**	**M/c A**
PI = $\frac{\text{Total DCFAT}}{\text{Initial Investment}}$ (Higher PI is preferable)	**1.024**	**1.029**	**M/c B**
Disc.Payback Period (Shorter Payback is preferable)	**3.93 years**	**3.82 years**	**M/c A**

Question 32

AT Limited is considering three projects A, B and C. The Cash Flow associated with the projects are given below (₹):

Project	C0	C1	C2	C3	C4
A	(10,000)	2,000	2,000	6,000	0
B	(2,000)	0	2,000	4,000	6,000
C	(10,000)	2,000	2,000	6,000	10,000

You are required to:

(a) Calculate the Payback Period of each of the three projects.

(b) If the Cut-Off Period is two years, then which Projects should be accepted?

(c) Projects with positive NPVs if the Opportunity Cost of Capital is 10 percent.

(d) "Payback gives too much weight to Cash Flows that occur after the cut-off date". True or False?

(e) "If a Firm used a single cut-off period for all projects, it is likely to accept too many short lived projects." True or False?

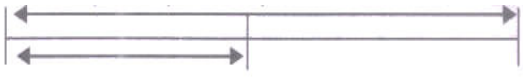
Year	0	1	2	3	4	5
PV Factor at 10%	1.000	0.909	0.826	0.751	0.683	0.621

Solution: 1.Workings for NPV and Cumulative DCF

		Project A			Project B			Project C		
Year	PVF	CF	DCF	Cum.DCF	CF	DCF	Cum.DCF	CF	DCF	Cum.DCF
1	0.909	2,000	1,818	1,818	0	0	0	2,000	1,818	1,818
2	0.826	2,000	1,652	3,470	2,000	1,652	1,652	2,000	1,652	3,470
3	0.751	6,000	4,506	7,976	4,000	3,004	4,656	6,000	4,506	7,976
4	0.683	0	0	7,976	6,000	4,098	8,754	10,000	6,830	14,806
Total DCF			7,976			8,754			14,806	
Less: Initial Invt			(10,000)			(2,000)			(10,000)	
NPV			**(2,024)**			**6,754**			**4,806**	

Z. Discounted Payback Period: Project A does not payback considering Time Value of Money at 10%.

Discounted Payback period on time proportion basis is computed as under -

Project B	Project C
Initial Invt of ₹ 2,000 is exceeded between Yr 2 & Yr 3.	Initial Invt of ₹ 10,000 is exceeded between Yr 3 & Yr 4.
Yr 2 4,656 - 1,652 = ₹ 3,004 for 12 months Yr 3	Yr 3 14,806 - 7,976 = ₹ 6,830 for 12 months Yr 4
	
₹ 1,652 ₹ 2,000 ₹ 4,656	₹ 7,976 ₹ 10,000 ₹ 14,806
(Initial Investment)	(Initial Investment)
So, Proportionate Time Period for earning (2,000 - 1,652)	So, Proportionate Time Period for earning (10,000-7,976)
= ₹ 348 = $\frac{₹\,348}{₹\,3,004}$ × 12 = **1.39 months.** So,	= ₹ 2,024 = $\frac{₹\,2,024}{₹\,6,830}$ × 12 = **3.56 months.** So,
Discounted Payback Period = 2 years, 1.39 months	**Discounted Payback Period = 3 years, 3.56 months**

Note: Alternatively, Discounted Payback Period can also be expressed as $2 + \frac{₹\ 348}{₹\ 3,004}$ = **2.11 years.**	**Note:** Alternatively, Discounted Payback Period can also be expressed as $3 + \frac{₹\ 2,024}{₹\ 6,830}$ = **3.30 years.**

3. Answers to Questions

Qn.	Answer
(a)	Discounted Payback Period for Project A: Nil, B: 2.11 years, C: 3.30 years **(as per WN 2 above).**
(b)	If the Cut-Off Period is 2 years, then none of the above Projects are acceptable, since Payback Period is higher. **Note:** However, without considering Time Value of Money at 10%, Project B has a Payback Period of exactly 2 years, and hence, may be considered acceptable.
(c)	**(Refer WN 1 above).** Projects B and C have Positive NPV.
(d)	**False.** Payback Period does not consider Post-Payback Cash Flows at all.
(e)	**True.** There may be projects with less inflows in initial years and heavy inflows in later years. Such Projects may be rejected because of longer payback. This problem arises when a Firm uses a single cut-off period for all projects. As a result, it may accept too many short-lived projects.

Question 33

Aar Cee Manufacturing Co. is considering a proposal to replace one of its existing machines by the CNC Machine. In this connection the following information is available:

The existing machine was bought 3 years ago for ₹ 15,40,000. It was depreciated on straight line basis and has a remaining useful life of 7 years. Its Annual Maintenance Cost is expected to increase by ₹ 40,000 from the sixth year of its installation. Its present Realisable Value is ₹ 6,50,000.

The Purchase Price of CNC Machine is ₹ 27,00,000 and Installation Expenses of ₹ 95,000 will be incurred. Subsidy equal to 15% of the Purchase Price will be received at the end of first year of its installation. It is subject to same rate of depreciation. Its Realisable Value after 7 years is ₹ 5,70,000. With the CNC Machine, Annual Cash Operating Costs are expected to decrease by ₹ 2,16,000. In addition, the CNC Machine would increase productivity on account of which Net Cash Revenue would increase by ₹ 2,76,000 per annum. Tax Rate is 30% and Cost of Capital is 11%.

Advice the Firm whether to replace the Existing Machine with CNC Machine on the basis of NPV.

Solution: 1.Basic Computations

Particulars	Existing Machine	CNC Machine
(a) Initial Investment	(already available) Hence, Nil	At Y_0 = Pure. Price + Installation (-) Sale of Old M/c = 27,00,000 + 95,000 (-) 6,50,000 = ₹ 21,45,000
(b) Life	Balance 7 years	Given 7 years
(c) Depreciation	$\frac{₹\ 15,40,000}{\text{Total 10 years}}$ = ₹ 1,54,000	(See **Note** below) $\frac{₹\ 18,20,000}{7\ \text{years}}$ = 2,60,000

Note: Depreciable Value of New Machine is computed as under -

Purchase Price	27,00,000
+ Installation Expenses capitalized	95,000
(-) 15% Subsidy on Purchase Price, i.e. 15% on 27,00,000	(4,05,000)
(-) Estimated Residual Value	(5,70,000)
Net Depreciable Value	**18,20,000**

Note: It is assumed that Installation Expenses is not eligible for Subsidy.

2.Cash Flow p.a. Computations

Particulars	**For Y-1 to Y-2**	**For Y-3 to Y-7**
(a) Post Tax Increase in Cash Revenue	2,76,000× (100% - 30%) = 1,93,200	= 1,93,200
(b) Post Tax Savings in Operating Costs	2,16,000× (100% - 30%) = 1,51,200	= 1,51,200
(c) Tax Savings on Depreciation	(2,60,000 - 1,54,000) × 30% = 31,800	= 31,800
(d) Post Tax Savings in Maint. Costs	Nil	40,000× (100% - 30%) = 28,000
Total Cash Flow as above	**3,76,200**	**4,04,200**

Note: Existing Machine will have increased Maintenance Cost from its 6th year, i.e. from Y-3 onwards for 5 years.

3.Tax Effect on Sale of Old Machine

(a) Net Book Value at Time 0 = 15,40,000 less 10% Depreciation for 3 years 4,62,000	10,78,000
(b) Loss on Sale = Net Book Value (-) Salvage Value = 10,78,000 - 6,50,000	4,28,000
(c) Tax Savings at 30% **(Note:** This is assumed to arise in Y-l. Alternatively, it can assumed as Y-0 also.)	1,28,400

4.Computation of NPV

Year	**Cash Flow**	**PVF at 11%**	**DCF**
0	Initial Investment (WN 1) = Outflow (21,45,000)	1.000	(21,45,000)
1	Capital Subsidy Inflow (Note in WN 1) = 4,05,000	0.901	3,64,905
1	Tax Saved on Loss on Asset sold (WN 3)=l,28,400	0.901	1,15,688

Ito 2	Cash Inflows p.a. (WN 2) = 3,76,200 p.a.	0.901+ 0.812 = 1.713	6,44,431
3 to 7	Cash Inflows p.a. (WN 2) = 4,04,200 p.a.	0.731+0.659+0.593+0.535+0.482 = 3.000	12,12,600
7	Inflow of Residual Value of CNC M/c = 5,70,000	0.482	2,74,740
	Net Present Value		**4,67,364**

Conclusion: Since NPV is positive, the proposal to replace the existing Machine with CNC Machine is worthwhile.

Question 34

A Company has ₹ 1,00,000 available for investment and has identified the following four investments in which to invest.

Project	**C**	**D**	**E**	**F**
Investment (₹)	**40,000**	**1,00,000**	**50,000**	**60,000**
NPV(₹)	**20,000**	**35,000**	**24,000**	**18,000**

You are required to optimize the returns from a package of projects within the capital spending limit if - (1) the projects are independent of each other and are divisible, (2) the projects are not divisible.

Solution: 1.Computation of PI and Rank based on PI

Particulars	**C**	**D**	**E**	**F**
1.Total DCFAT	40000+20000 = 60,000	100000+35000 = 1,35,000	50000+24000 = 74,000	60000+18000 =78,000
2. In vestment	40,000	1,00,000	50,000	60,000
3.PI = (1÷2)	**1.50**	**1.35**	**1.48**	**1.30**
4. PI Rank	**I**	**III**	**II**	**IV**

2.Optimal Investment Decision

Projects are independent and are divisible

(i.e. PI based decision making)

↓

Rank & PI	**Project**	**Investment**	**NPV**

Projects are not divisible

(i.e. Combination of Projects with Max.NPV)

(Note 2) ↓

Combination & Invt	**NPV**

I. **1.50**	C	40,000	20,000
II. **1.48**	E	50,000	24,000
III. **1.35**	D	(Note 1) 10,000	(pro-rata) 3,500
		1,00,000	**47,500**

D (1,00,000)	Given = 35,000
C+F (1,00,000)	20000+18000 = 38,000
C+E (90,000)	20000+24000 = 44,000

Projects C & E combination is preferable.

Note 1: In Project D, the balance available fund (= 1,00,000 - C 40,000 - E 50,000) = 10,000 will be invested, as the project is divisible. Hence, proportionate NPV will be earned, i.e. $\frac{35,000}{1,00,000}$ × 10,000 = 3,500.

Note 2: When Projects are NOT divisible, combinations of Investments which will result in the spending of 1,00,000 are identified. For this purpose, since there is no pre-condition that all 1,00,000 should be spent, the 3rd Option (i.e. spending of 90,000) will result in the maximum NPV, and is hence preferable.

WORKING CAPITAL

Question 35

The following information is provided by MNP Ltd for the year ending 31st March -

Raw Material Storage Period	**45 days**
Work-in-Progress Conversion Period	**20 days**
Finished Goods Storage Period	**25 days**
Debt Collection Period	**30 days**
Creditors Payment Period	**60 days**
Annual Operating Cost (Including Depreciation of ₹ 2,50,000)	**₹ 25,00,000**

Assuming 360 days in a year, you are required to calculate -

1. Operating Cycle Period.

2. Number of Operating Cycles in a year.

3. Amount of Working Capital required for the Company on a cost basis.

4. The Company is a market leader in its product and it has no competitor in the market. Based on a Market Survey, it is planning to discontinue Sales on credit and deliver products based on pre-payments in order to reduce its Working Capital requirement substantially. Compute the reduction in Working Capital Requirement in such a scenario.

Solution:

1. **Operating Cycle (days)** = (RM Stock Holding Period + WIP Conversion Period + Finished Goods Storage Period + Debtors Collection Period) **Less:** Creditors Collection Period) (all in days) = (45 + 20 + 25 + 30- 60) = **60 days.**

2. No of Operating Cycles in a year = $\frac{360}{60}$ = **6**

3. Cash Operating Expenses p.a. = 25,00,000 - 2,50,000 = ₹ **22,50,000**

So, Working Capital required = ₹ 22,50,000 × $\frac{60}{360}$ = **₹ 3,75,000**

4. If Debtors Collection Period is Nil, the Operating Cycle will be = 60 -30 = **30 days.**

Hence, revised Working Capital requirement = ₹ 22,50,000 × $\frac{30}{360}$ = ₹ 1,87,500.

So, reduction in Working Capital requirement = ₹ 3,75,000 - ₹ 1,87,500 = ₹ **1,87,500.**

Question 36

Calculate the amount of Working capital required for XYZ Ltd. From the following information per unit (₹)

Elements of cost	
Raw material	80.00
Direct labour	30.00
Overheads	60.00

Total Cost	170.00
Profit	30.00
Sales	200.00

Raw Materials are held in stock on an average for one month. Work-in-Progress (Completion Stage 50%), on an average half a month. Finished Goods are in stock on an average for one month. Credit allowed by Suppliers is one month and Credit allowed to Debtors is two months. Time lag in payment of Wages is 1⅛ weeks. Time lag in payment of Overheads is one month. One fourth of the Sales are made on cash basis. Cash in Hand and at Bank is expected to be ₹ 50,000.

You are required to prepare a Statement showing the Working Capital needed to finance a level of activity of 52,000 units of production. Assume that production is carried on evenly throughout the year and Wages and Overheads accrue similarly. For the calculation purpose, 4 weeks may be taken as equivalent to a month and 52 weeks in a year.

Solution: Statement of Working Capital Requirements (Total Approach)

Note: Since Depreciation is not specified in the question, Total Approach is applied here.

Particulars	Quantity	Rate p.u.	₹
A. Current Assets			
Raw Materials Stock	52,000 units × $\frac{4}{52}$ = 4,000 units	RM Cost ₹ 80	3,20,000
WIP Stock **(See Note 2)**	52,000 units × $\frac{2}{52}$ = 2,000 units	50% of Total Cost 170 = ₹85	1,70,000
Finished Goods Stock	52,000 units × $\frac{4}{52}$ = 4,000 units	Total Cost ₹ 170	6,80,000

Debtors **(Note 3)**	52,000 units × 3/4th × $\frac{8}{52}$ = 6,000 units	Sale Price = ₹ 200	12,00,000
Cash and Bank	Given		50,000
Total			**24,20,000**
B. Current Liabilities			
Creditors **(See Note 1)**	52,000 units × $\frac{4}{52}$ = 4,000 units	RM Cost ₹ 80	3,20,000
Wages Payable	52,000 units × $\frac{1.5}{52}$ = 1,500 units	Labour Cost ₹ 30	45,000
OH Payable	52,000 units × $\frac{4}{52}$ = 4,000 units	OH Cost ₹ 60	2,40,000
Total			**6,05,000**
C. Net Working Capital	**(A-B)**		**18,15,000**

Note 1: Alternatively, the following quantity computations may also be adopted -

• Total Purchase Quantity of RM = RM Consumed for Production 52,000 + RM Stockholding 4,000 + RM included in WIP

Stock 2,000 = 58,000 units. Hence, Creditors Quantity = 58,000 × $\frac{4}{52}$ = 4,462 units.

• Quantity for which Wages & OH incurred = Wages for Production 52,000 + Wages for WIP Stock 2,000 = 54,000 units.

So, Quantity for Wages & OH Payable = 54,000 × $\frac{1.5}{52}$ = 1,558 units.

Note 2: WIP is taken at 50% of Total Cost, as per the language used in the question. Alternatively, it can be treated as Materials fully issued + Conversion 50% complete.

Note 3: If Debtors are based on Cost, it will be taken at ₹ 170 p.u, i.e. Amount ₹ 10,20,000.

Question 37

PK Ltd, a Manufacturing Company, provides the following information -

Sales	**₹ 1,08,00,000**
Raw Material Consumed	**₹ 27,00,000**
Labour Paid	**₹ 21,60,000**
Manufacturing Overhead (including Depreciation for the year ₹ 3,60,000)	**₹ 32,40,000**
Administrative and Selling Overhead	**₹ 10,80,000**

Additional Information:

(a) Receivables are allowed 3 months' credit.

(b) Raw Material Supplier extends 3 months' credit.

(c) Lag in payment of Labour is 1 month.

(d) Manufacturing Overheads are paid one month in arrear.

(e) Administrative and Selling Overhead is paid 1 month advance.

(f) Inventory Holding Period of Raw Material and Finished Goods are of 3 months.

(g) Work in Progress is Nil.

(h) PK Ltd sells goods at Cost plus 1/3rd.

(i) Cash Balance ₹ 3,00,000

(j) Safety Margin 10%.

You are required to compute the Working Capital Requirements of PK Ltd on Cash Cost Basis.

Solution: 1. Trading and P&L Account for the year (to confirm GP Ratio and compute Net Profit)

Particulars	₹	Particulars	₹
To Materials Consumed	27,00,000	By Sales	1,08,00,000
To Wages	21,60,000		
To Manufacturing Exps:(Cash Exp) (32,40,000 - 3,60,000)	28,80,000		
To Depreciation	3,60,000		
To Gross Profit **(balancing figure)**	**27,00,000**		
Total	**1,08,00,000**	**Total**	**1,08,00,000**
To Administration and Selling OH	10,80,000	By Gross Profit b/d	27,00,000
To Net Profit **(balancing figure)**	**16,20,000**		
Total	**27,00,000**	**Total**	**27,00,000**

Note: GP Ratio = $\frac{27,00,000}{1,08,00,000}$ = **1/4th on Sales,** which is 1/3rd on Cost. So, given GP Ratio of Cost + 1/3rd is confirmed.

2. Statement of Working Capital Requirements (Cash Cost Approach)

Particulars	Computation	₹
A. Current Assets		
Raw Material Stock (based on RM Consumed)	₹ 27,00,000 × $\frac{3}{12}$	6,75,000
Finished Goods Stock (based on Cash COP)	(₹ 27,00,000 + ₹ 21,60,000 + ₹ 28,80,000) × $\frac{3}{12}$	19,35,000
Debtors (based on Sales Less Profit & Deprn)	(₹ 1,08,00,000 - ₹ 16,20,000- ₹ 3,60,000) × $\frac{3}{12}$	22,05,000

Prepaid Administrative & Selling OH	₹ 10,80,000 × $\frac{1}{12}$	90,000
Cash and Bank balances (given)		3,00,000
Total		**52,05,000**
B. Current Liabilities		
Creditors (based on RM Consumed)	₹ 27,00,000 × $\frac{5}{12}$	6,75,000
Wages Payable	₹ 21,60,000 × $\frac{1}{12}$	1,80,000
Manufacturing OH Payable	₹ 28,80,000 × $\frac{1}{12}$	2,40,000
Total		10,95,000
C. Net Working Capital	**A-B**	**41,10,000**
D. Safety Margin	10% on ₹ 41,10,000	4,11,000
E. Required Working Capital	**C + D**	**45,21,000**

Note: Alternative assumptions exist, e.g. Creditors may be computed based on RM Purchase (Usage + Closing RM), etc.

B. Current Liabilities					
Creditors for Materials	78,000 × $\frac{8}{52}$ = 12,000	RM Cost = ₹ 117	14,04,000	RM Cost = ₹ 117	14,04,000
Wages Payable	78,000 × $\frac{1}{52}$ = 1,500	Labour Cost ₹ 49	73,500	Labour Cost ₹ 49	73,500
Overheads Payable	78,000 × $\frac{2}{52}$ = 3,000	Total 98 — Deprn 18 = ₹ 80	2,40,000	Total 98 — Deprn 18 = ₹ 80	2,40,000
Total			**17,17,500**		**17,17,500**
C. Net Working Capital			**29,51,500**		**24,81,700**

Note 1: Average Stockholding has been assumed in the above computations. Alternatively, the following quantity computations may also be adopted -

• Total Purchase Quantity of RM = RM Consumed for Production 78,000 + RM Stockholding 6,000 + RM included in WIP

Stock 3,000 = 87,000 units. Hence, Creditors Quantity = 87,000 × $\frac{8}{52}$ = 13,385 units.

• Quantity for which Wages incurred = Wages for Production 78,000 + Wages for WIP Stock 60% of 3,000 = 79,800 units. So, Quantity for Wages Payable = 79,800 × $\frac{1}{52}$ = 1,535 units.

• Quantity for which OH incurred = OH for Production 78,000 + OH for WIP Stock Nil = 78,000 units. So, Quantity for OH Payable = 78,000 × $\frac{2}{52}$ = 3,000 units.

Note 2: In the absence of specific percentage of completion for OH in WIP, it is assumed that OH are yet to be incurred. Hence, WIP is valued at proportionate Material and Labour Cost only. Alternatively, OH can also be assumed to be incurred at the same rate as Labour, and hence taken at 60% complete.

Question 38

Ram Enterprises has been operating its manufacturing facilities till the previous financial year, on a single shift working with the following cost structure:

Particulars	₹.
Cost of Materials	6.00
Wages (out of which 40% fixed)	5.00
Overheads (out of which 80% fixed)	5.00
Profit	2.00
Selling Price	18.00

Sales during the previous financial year was ₹4,32,000. As at the end of the above financial year, the Company held -

Particulars	₹.
Stock of Raw Materials (at cost)	36,000
Work-in-Progress (valued at Prime Cost)	22,000
Finished Goods (valued at Total Cost)	72,000
Sundry Debtors	1,08,000

In view of increased market demand, it is proposed to double production by working an extra shift. It is expected that a 10% discount will be available from Suppliers of Raw Materials in view of increased volume of business. Selling Price will remain the same. The credit period allowed to Customers will remain unaltered. Credit availed of from Suppliers will continue to remain at the present level of 2 months. Lag in Payment of Wages and Expenses will continue to remain half a month.

Evaluate the Additional Working Capital requirements, if the policy to increase output is implemented. Ignore Depreciation.

Solution: 1. Basic Computations

• Sales Quantity in last year = $\frac{₹4,32,000}{₹18}$ = 24,000 units. This will double to 48,000 units due to two-shift working.

• Quantities as applicable for present Single Shift Working are computed as under -

(a) Raw Material Stock Quantity (based on RM Cost) = $\frac{₹36,000}{₹6}$ = 6,000 units.

(b) WIP Stock Quantity (based on Prime Cost) = $\frac{₹22,000}{₹(6+5)}$ = 2,000 units.

(c) Finished Goods Stock Quantity (based on Total Cost) = $\frac{₹72,000}{₹(6+5+5)}$ = 4,500 units.

(d) Debtors Quantity (based on Sales Price) = $\frac{₹1,08,000}{₹18}$ = 6,000 units.

2. Cost Sheet for Single and Double Shift Working (amounts in ₹.)

Particulars for	24,000 Units		48,000 Units	
	Per Unit	Total	Per Unit	Total
Raw Materials	6.00	1,44,000	6.00 (-) 10% = 5.40	2,59,200
Wages - Variable	5 × 60% = 3.00	72,000	Same as previous = 3.00	1,44,000
Fixed	5 × 40% = 2.00	48,000	(computed) = 1.00	(same) 48,000
Overheads - Variable	5 × 20% = 1.00	24,000	Same as previous = 1.00	48,000
Fixed	5 × 80% = 4.00	96,000	(computed) = 2.00	(same) 96,000
Total Cost	16	3,84,000	12.40	5,95,200
Add: Profit	2	48,000	(bal. figure) = **5.60**	**2,68/800**
Sales	18	4,32,000	Same as previous =18.00	8,64,000

3. Statement of Working Capital Requirements

Particulars	**Single Shift**			**Double Shift**		
	Units	**Rate (₹.)**	**Amt (₹.)**	**Units**	**Rate (₹.)**	**Amt (₹.)**
A. CURRENT ASSETS						
Raw Materials Stock	6,000	RM Cost = 6	3,600	12,000	RM Cost = 5.40	64,800
Work-in-Progress Stock	2,000	Prime Cost=11	22,000	2,000	5.40+3.00+1.00=9.40	18,800
Finished Goods Stock	4,500	Total Cost=16	72,000	9,000	Total Cost= 12.40	1.11,600
Sundry Debtors	6,000	Sale Price=18	1,08,000	12,000	Sale Price = 18.00	2,16,000
Total Current Assets			**2/38,000**			**4/11/200**
B. CURRENT LIABILITIES						
Creditors for Materials	4,000	RM Cost = 6	24,000	8000	RM Cost = 5.40	43,200
Creditors for Wages	1,000	Labour = 5	5,000	2000	Labour = 3+1 = 4.00	8,000
Creditors for Expenses	1,000	OH Cost = 5	5,000	2000	OH = 1+2 = 3.00	6,000
Total Current Liabilities			**34/000**			**57/200**

C. Working Capital (A-B)			**2/04/000**			**3/54/000**
D. Profit included in Debtors	6,000	2	12,000	12000	5.60	67,200
E. Working Capital Cash Basis		**C-D**	**1,92,000**		**C-D**	**2,86,800**

Thus, Increase in Working Capital requirement due to second shift = ₹.2,86,800- 1,92,000) = ₹94,800 on cash cost basis.

Note: Due to Double Shift Working, all quantities relating to RM Stock, FG Stock, Debtors, Creditors, Wages Payable, OH

Payable, etc. will be double of what is applicable for Single Shift working. This is due to doubling of Sales Quantity as a whole. However, **quantity of WIP Stock will not change,** since work started in the First Shift will be completed in the Second Shift.

Note 2: The above computation is based on the assumption that Double Shift is to be worked **permanently** on a long term basis to meet increased sales demand.

However, if it is assumed that the increased demand is a short-term effect, the Quantity in respect of Creditors for Materials will be as under -

(a) Raw Materials to be purchased = RM required for Sale Qtty + Closing RM Stock (-) Opening RM Stock

= 48,000 + 12,000 - 6,000 = **54,000 units**

(b) Creditors for Materials (based on 2 months credit) = 54,000 units x 2/12 = **9,000 units.**

All other Items will be at the **same** Quantities, Rates and Amounts as per Table above, in such a case.

Question 39

Slide Ltd is preparing a Cash Flow Forecast for the three months period from January to the end of March. The following sales volumes have been forecasted:

	December	January	February	March	April
Sales (units)	**1,800**	**1,875**	**1,950**	**2,100**	**2,250**

Selling Price per unit is ₹ 600. Sales are all on 1 month credit. Production of goods for sale takes place one month before sales. Each unit produced requires 2 units of Raw Materials costing ₹ 150 per unit. No Raw Material Inventory is held. Raw Materials purchases are on one month credit. Variable Overheads and Wages equal to ₹ 100 per unit are incurred during production and paid in the month of production. The Opening Cash Balance on 1st January is expected to be ₹ 35,000. A long-term Loan of ₹ 2 Lakhs is expected to be received in the month of March. A Machine costing ₹ 3,00,000 will be purchased in March.

(a) Prepare a Cash Budget for the months of January, February and March and calculate the Cash Balance at the end of each month in the 3 months period.

(b) Calculate the Forecast Current Ratio at the end of the three months period.

Solution:

1. Basic Computations

Month	December	January	February	March	April
(a) Sale Quantity (given)	1,800	1,875	1,950	2,100	2,250
(b) Sale Value = (a × ₹ 600)	10,80,000	11,25,000	11,70,000	12,60,000	13,50,000
(c) Material Cost = (a × 2 units RM × ₹ 150 pu)	5,40,000	5,62,500	5,85,000	6,30,000	6,75,000
(d) VOH & Wages = (a × ₹ 100 pu)	1,80,000	1,87,500	1,95,000	2,10,000	2,25,000

WN 1: Given that Production takes place 1 month before, hence January's Sale Quantity (1,875 units) will be produced in December, for which Materials will be purchased in December (no RM Inventory is held). For this December purchase, payment (1 month credit) will be made in January.

WN 2: VOH and Wages of any month will be the amount in respect of next month's sale, since production takes place 1 month before, and the payment in respect of VOH and Wages is made in the month of production itself.

2. Cash Budget

Month	January	February	March
		From Jan:	From Feb:
(a) Opening Balance	Given = 35,000	3,57,500	6,87,500
	Dec Sales:	Jan Sales:	Feb Sales:
(b) Receipts: Collection from Debtors	10,80,000	11,25,000	11,70,000
	—	—	Given: 2,00,000
Sub Total Receipts	**10,80,000**	**11,25,000**	**13,70,000**
(c) Payments: Creditors **(WN 1)**	5,62,500	5,85,000	6,30,000
	1,95,000	2,10,000	2,25,000
			3,00,000
Sub Total Payments	**7,57,500**	**7,95,000**	**11,55,000**
(d) Closing Balance = (a + b - c)	**3,57,500**	**6,87,500**	**9,02,500**

3. Current Ratio as on 31st March

Particulars	₹
Current Assets: Stock on 31st March = April's Sale Qtty 2,250 unitsx(RM Cost ₹ 300 + Conversion ₹ 100)	9,00,000
Debtors on 31st March = March's Sale Proceeds pending collection	12,60,000
Cash & Bank Balances as per WN 2 above	9,02,500

Total Current Assets	**30,62,500**
Current Liabilities: Creditors on 31st March = RM Cost of April's Sale Quantity 2,250 units x RM Cost 300	**6,75,000**
Current Ratio = Current Assets ÷ Current Liabilities	**4.54 times**

Question 40

HT Ltd has Sales of ₹ 960 Lakhs. Selling Price per unit is ₹ 80 and Variable Operating Cost is 75% of Selling Price and Average Cost per unit is ₹ 70. The cost of funds is 12%. Average Collection Period is 75 days, Bad Debt Losses are 4% of Sales and Collection Expenses are ₹ 15.60 Lakhs. The Company is considering whether collection policies should be made strict. Due to rigorous collection procedures, Sales are expected to decline to ₹ 920 Lakhs. Average Collection Period will reduce to 60 days and Bad Debts will reduce to 2.5% of Sales. Annual Collection Expenses will increase to ₹ 22.50 Lakhs.

Should the Company carry out the proposal? (Assume 360 days pa and Investment in Debtors are calculated on Total Cost)

Solution:

Particulars (amounts in ₹ Lakhs)	**Present**	**Proposed**
1. Sales	Given = 960.00	Given = 920.00
2. Variable Cost = 75% of Sales	720.00	690.00
3. Contribution = (1) - (2)	**240.00**	**230.00**
4. Fixed Cost = See **Note** below	120.00	Same = 120.00
5. Profit = (3) - (4)	**120.00**	**110.00**
6. Cost of Debtors = Total Cost = (2+4)	840.00	810.00
7. Average Collection Period	75 days	60 days
8. Average Debtors = $\frac{(6)\times(7)}{360\text{ days}}$	175.00	135.00
9. Interest on Debtors at 12%	21.00	16.20
10. Bad Debts (4% and 2.5% on Sales)	4% on Sales = 38.40	2.5% on Sales = 23.00
11. Collection Expenses	Given = 15.60	Given = 22.50
12. **Net Benefit = (5 - 9 - 10 - 11)**	**45.00**	**48.30**

Note: Present Sale Qtty = $\frac{₹\ 960\text{ Lakhs}}{₹\ 80\text{ per unit}}$ = 12 Lakh Units. Present Total Costs = 12 Lakh Units × ₹ 70 = ₹ 840 Lakhs.

Present **Fixed Cost** = Total Cost (-) Variable Cost as per (2) above = ₹ 840 Lakhs (-) ₹ 720 Lakhs = ₹ **120 Lakhs.**

Conclusion: The proposal may be implemented, due to additional Net Benefit of ₹ **3.30 Lakhs**.

Question 41

MN Ltd has a current turnover of ₹ 30,00,000 p.a. Cost of Sales is 80% of Turnover and Bad Debts are 2% of Turnover. Cost of Sales includes 70% Variable Cost and 30% Fixed Cost, while Company's required Rate of Return is 15%. MN Ltd currently allows 15 days credit to its Customers, but it is considering increase this to 45 days credit in order to increase turnover.

It has been estimated that this change in policy will increase turnover by 20%, while Bad Debts will increase by 1%. It is not expected that the policy change will result in an increase in Fixed Cost and Creditors and Stock will be unchanged.

Should MN Ltd introduce the proposed Policy? (Assume a 360 days Year).

Solution:

Particulars	**Present**	**Proposed**	**Additional**
1. Sales	Given = 30,00,000	Given + 20% = 36,00,000	6,00,000
2. Variable Cost = 70% x 80% x (1) = 56% of Sales	16,80,000	20,16,000	3,36,000
3. **Contribution = (1) - (2)**	**13,20,000**	**15,84,000**	**2,64,000**
4. Fixed Cost = 30% × 80% × (1) = 24% of Sales	7,20,000	**Same** = 7,20,000	Nil
5. Profit	**6,00,000**	**8,64,000**	**2,64,000**
6. Cost of Debtors = Total Cost = (2+4)	24,00,000	27,36,000	3,36,000
7. Average Collection Period	15 days	45 days	30 days
8. Average Debtors = $\frac{(6)\times(7)}{360\text{ days}}$	1,00,000	3,42,000	2,42,000
9. Interest on Debtors at 15%	15,000	51,300	36,300
10. Bad Debts (2% and 3% on Sales)	2% on Sales = 60,000	3% on Sales = 1,08,000	48,000
11. **Net Benefit = (6 - 9 - 10)**	**5,25,000**	**7,04,700**	**1,79,700**

Observation: The proposal may be introduced due to **Additional Net Benefit** as computed above.

Alternative Approach:

Note: Fixed Cost = 30% × 80% = 24%, Variable Cost = 70% × 80% = 56%, Contribution = 100% - 56% = 44%.

Particulars	**₹**
1. Proposed Investment in Debtors [Var.Cost (36,00,000 × 56%)+Fixed Cost (30,00,000 ×	3,42,000

24%)] × $\frac{45 \text{ days}}{360 \text{ days}}$	
2. Current Investment in Debtors [Var.Cost (30,00,000 × 56%)+Fixed Cost (30,00,000 × 24%)] × $\frac{15 \text{ days}}{360 \text{ days}}$	1,00,000
3. **Increase in Investment in Debtors = (1) - (2)**	**2,42,000**
4. Increase in Contribution as above	2,64,000
5. Increase in Bad Debts as above	48,000
6. Increase in Finance Costs = Increase in Investment in Debtors x 15% = (3) x 15%	36,300
7. **Savings by introducing Chang in Policy = (4 - 5 - 6)**	**1,79,700**

Question 42

Under an advance factoring arrangement, Super Factors Ltd (SFL) has advanced a sum of ₹ 14 Lakhs against the Book Debts of Ramesh Ltd. The agreement provides for 80% advance (maintaining a Reserve of 20% to provide for disputes, allowances, returns and other deductions) of the value of Factored Book Debts. The Advance carries an interest of 20% p.a. compounded quarterly. Factoring Commission is 1.5% of the value of Factored Book Debts. Both Interest & Commission are collected upfront.

From the above data, answer the following questions -

1. What is the amount of advance payable? What is the effective cost of funds made available to Ramesh Ltd?

2. Suppose SFL collects the Commission upfront but Interest is collected in arrears, what is the effective cost of funds made available to Ramesh Ltd?

Solution: Computation of Effective Rate

Note: Value of Factored Receivables = $\frac{\text{Advance 14 Lakhs}}{80\%}$ = ₹ 17.50 Lakhs.

Particulars	**Interest & Commission in Advance**	**Int. in Arrears & Commn. in Advance**
Interest Charges	Advance ₹ 14.00 × 20% × $\frac{1 \text{ Quarter}}{4 \text{ Quarters}}$ = 0.70	Nil
Commission Charges	Value of Receivables ₹ 17.50 × 1,50% = 0.26	Value of Receivables ₹ 17.50 × 1.50% = 0.26
Cost charged in Advance	**0.96**	**0.26**
Net Funds Available	14.00 - 0.96 = **13.04**	14.00 - 0.26 = **13.74**
Total Cost as a percentage	$\frac{₹ 0.96 \text{ Lakhs}}{₹ 13.04 \text{ Lakhs}}$ = **7.36%**	$\frac{₹ 0.96 \text{ Lakhs}}{₹ 13.74 \text{ Lakhs}}$ = **6.99%**
Annualized Rate of Cost	$[(1 + 0.0736)^4 - 1] = 1.3285 - 1 =$	$[(1 + 0.0699)^4 - 1] = 1.3103 - 1 =$

	32.85%	**31.03%**
Interest as a percentage	$\frac{₹\ 0.70\ Lakhs}{₹\ 13.04\ Lakhs}$ = **5.37%**	$\frac{₹\ 0.70\ Lakhs}{₹\ 13.74\ Lakhs}$ = **5.09%**
Annualized Rate of Interest	$[(1 + 0.0537)^4 - 1] = 1.2327 - 1 =$ **23.27%**	$[(1 + 0.0509)^4 - 1] = 1.2197 - 1 =$ **21.97%**

Question 43

Jaidev Ltd has total credit sales of ₹40 Lakhs p.a. and its average collection period is 90 days. The past experience indicates that the Bad Debt losses are around 3% of credit sales. Jaidev spends about ₹1,00,000 per annum on administrating its credit sales. It is considering availing the services of a Factoring Firm. It has received offer from Uday Ltd, which agrees to buy the receivables of Company. Uday will charge Commission of 3% and also agrees to pay advance against receivables at an Interest Rate of 18% p.a after withholding 10% as Reserve. Should Jaidev accept Uday's offer if the former's ROI is 15%? Assume 360 days in a year.

Solution:

Net Amount Paid to the Firm	₹.
Avg Receivables (40 Lakhs × $\frac{90}{360}$)	10,00,000
Less: 10% Factor Margin Money	(1,00,000)
Amount of Finance Offered	**9,00,000**
Less: Factor Commission (3% × 10,00,000)	(30,000)
Amount Available for Advance	**8,70,000**
Less: Interest (8,70,000 × 18% × $\frac{90}{360}$)	(39,150)
Net Amount Paid to the Firm	**8,30,850**

Cost of Factoring p.a.	₹.
Commission for 90 Days	30,000
Add: Interest for 90 Days	39,150
Total Cost for 90 Days	**69,150**
Total Cost p.a. (69,150 × $\frac{360}{90}$)	**2,76,600**
Less: Administration Cost Savings	(1,00,000)
Bad Debts (40 Lakhs × 3%)	(1,20,000)
Effective Cost of Factoring	**56,600**

Effective Rate of Factoring Cost = $\frac{56,600}{8,30,850}$ × 100 = **6.81%**

Decision: Since the Company's ROI of 15% is higher than the Cost of Factoring, the Factoring Proposal is worth wile.

RATIO

Question 44

Following information relates to RM Co. Ltd -

Total Assets Employed	**₹ 10,00,000**
Direct Cost	**₹ 5,50,000**
Other Operating Cost	**₹ 90,000**

- **Goods are sold to Customers at 150% of Direct Costs.**

- 50% of the Assets are being financed by Borrowed Capital at an interest cost of 8% per annum.
- Tax Rate is 30%.

Calculate - (1) Net Profit Margin, (2) Return on Assets, (3) Asset Turnover, (4) Return on Equity.

Solution: (information in ₹)

1. Total Assets	10,00,000
2. Debt at 50% of Total Assets	5,00,000
3. Equity at 50% of Total Assets (1 - 2)	5,00,000
4. Sales (150% of 5,50,000)	8,25,000
5. Direct Costs (given)	5,50,000
6. Operating Costs (given)	90,000
7. EBIT (4-5-6)	1,85,000
8. **Less:** Interest at 8% on Debt of 5,00,000	40,000
9. EBT (7 - 8)	1,45,000
10. **Less:** Tax at 30%	43,500
11. EAT (9- 10)	1,01,500
12. Net Profit Margin (after Tax) = EAT ÷ Sales = (11) ÷ (4)	**12.30%**
Alternatively, Net Profit Margin (before Tax) = EBT ÷ Sales = (9) ÷ (4)	**17.58%**
13. Return on Assets (Pre-Tax) = EBIT ÷ Total Assets = (7) ÷ (1)	**18.50%**
Alternatively, ROA (post-Tax) = EBIT (100%-Tax) ÷ Total Assets = (7) × (100% - 30%)] ÷ (1)	**12.95%**
14. Asset Turnover = Sales ÷ Total Assets = (4) ÷ (1)	**0.825 times**
15. Return on Equity = EAT ÷ Equity = (11) ÷ (3)	**20.30%**

Question 45

Following figures and ratios are related to a Company Q Ltd

Sales for the year (all credit)	**₹ 30,00,000**	**Current Ratio**	**1.5:1**
Gross Profit Ratio	**25 per cent**	**Receivables (Debtors) Collection Period**	**2 months**
Fixed Assets Turnover (based on Cost of Goods Sold)	**1.5**	**Reserves and Surplus to Share Capital**	**0.6:1**

Stock Turnover (based on Cost of Goods Sold)	6	Capital Gearing Ratio	0.5
Liquid Ratio	1:1	Fixed Assets to Net Worth	1.20:1

Calculate - Closing Stock, Fixed Assets, Current Assets, Debtors and Net Worth.

Solution:

1. Since GP = 25%, COGS = 75% of Sales = 75% of ₹ 30,00,000 = ₹ **22,50,000**

2. Stock T/O= $\frac{\text{Cost of Goods Sold}}{\text{Average Stock}} = \frac{₹\ 22,50,000}{\text{Stock}}$ =**6 times**. So, Stock= $\frac{₹\ 22,50,000}{6}$ = ₹ **3,75,000** (assumed Closing Stock)

3. Given Collection Period = 2 months. So, Debtors = Credit Sales × $\frac{2}{12}$ = ₹ 30,00,000 × $\frac{2}{12}$ = ₹ **5,00,000**

4. Fixed Assets T/O= $\frac{\text{Cost of Goods Sold}}{\text{Fixed Assets}} = \frac{₹\ 22,50,000}{\text{Fixed Assets}}$ =**1.5 times**. So, Fixed Assets= $\frac{₹\ 22,50,000}{1.5}$ = ₹ **15,00,000**

5. Fixed Assets to Net Worth = $\frac{\text{Fixed Assets}}{\text{Net Worth}} = \frac{₹\ 15,00,000}{\text{Net Worth}}$ = **1.2 times**. So, Net Worth = $\frac{₹\ 15,00,000}{1.2}$

= ₹ **12,50,000**

Reserves & Surplus Share Capital

Ratio: 0.6 :1

So, Amount apportioned ₹ 4,68,750 ₹ 7,81,250

Note: Amount of Reserves and Surplus and Share Capital are shown for Information Value only.

6. Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$ =1.5 times. So, CA = 1.5 CL

Liquid Ratio - $\frac{\text{Current Assets} - \text{Closing Stock}}{\text{Current Liabilities}} = \frac{CA - 3,75,000}{L} = \frac{1.5CL - 3,75,000}{CL}$ = **1:1**

Cross-multiplying, we have, 1.5 CL - 3,75,000 = CL. Transposing & solving, we have, CL = $\frac{3,75,000}{0.5}$ = ₹ .**7,50,000**

So, Current Assets = 1.5 times of Current Liabilities = 1.5 × ₹ 7,50,000 = ₹ **11,25,000**

Question 46

The following is the information of XML Ltd related to the Year ended 31st March -

(a) Gross Profit	20% of Sales	(f) Non-Current Assets to Current Assets	1 :2
(b) Net Profit	10% of Sales	(g) Current Ratio	2:1
(c) Inventory Holding Period	3 Months	(h) Non-Current Liabilities to Current Liabilities	1:1
(d) Receivable Collection Period	3 Months	(i) Share Capital to Reserves and Surplus	4:1
(e) Non-Current Assets to	1:4	(f) Non-Current Assets at period	₹ 50,00,000

Sales		beginning	

Assume that:

(i) No Change in Non-Current Assets during the year.

(ii) No Depreciation charged on Non-Current Assets during the year.

(iii) Ignore Tax.

You are required to calculate Cost of Goods Sold, Net Profit, Inventory, Receivables and Cash for the year ended on 31st March.

Solution:

1. Non Current Assets (NCA) to Sales = $\frac{\text{NCA}}{\text{Sales}} = \frac{1}{4}$. So, $\frac{₹\ 50\ \text{Lakhs}}{\text{Sales}} = \frac{1}{4}$. So, Sales = ₹ 50 Lakhs x 4 = ₹ **200 Lakhs**

2. GP Rate = 20% of Sales. So, COGS = 80% of Sales. Hence, COGS = ₹ 200 Lakhs x 80% = ₹ **160 Lakhs.**

3. Net Profit = 20% of Sales Hence, **Net Profit** = ₹ 200 Lakhs x 10% = ₹ **20 Lakhs.**

4. Inventory = $\frac{\text{COGS}}{12\ \text{Months}}$ × 3 Months Hence, Inventory = $\frac{₹\ 160\ \text{Lakhs}}{12\ \text{Months}}$ × 3 Months = ₹ **40 Lakhs.**

5. Receivables = $\frac{\text{Sales}}{12\ \text{Months}}$ × 3 Months Hence, Inventory = ₹ 200 Lakhs

12 Months × 3 Months = ₹ **50 Lakhs.**

6. NCA to Current Assets (CA) = $\frac{\text{NCA}}{\text{Current Assets}} = \frac{1}{2}$. So, $\frac{₹\ 50\ \text{Lakhs}}{\text{CA}} = \frac{1}{2}$. So, CA = ₹ 50 Lakhs x 2 = ₹ **100 Lakhs.**

7. CA = Cash + Inventory + Receivables. So, Cash = ₹ 100 Lakhs - ₹ 40 Lakhs - ₹ 50 Lakhs = ₹ **10 Lakhs.**

Question 47

Following data has been gathered from the books of Tram Ltd, the Equity Share of which is trading in the stock market at ₹ 14.

Equity Share Capital (Face Value ₹ 10)	₹ 10,00,000	Profit before Interest and Tax for the year	₹ 4,00,000
10% Preference Shares	₹ 2,00,000	Interest	₹ 60,000
Reserves	₹ 8,00,000	Profit after Tax for the year	₹ 2,40,000
10% Debentures	₹ 6,00,000		

Calculate the following - (1) Return on Capital Employed, (2) Earnings per Share, (3) PE Ratio.

Solution:

1.Equity = Equity Share Capital + 10% Preference Shares + Reserves = 10,00,000 + 2,00,000 + 8,00,000	₹ 20,00,000
2.Debt = 10% Debentures	₹ 6,00,000
3.Capital Employed = Equity + Debt	₹ 26,00,000
4. **ROCE** = $\frac{\text{EBIT}}{\text{Capital Employed}} = \frac{₹\ 4,00,000}{₹\ 26,00,000}$	**15.38%**

Particulars	₹	₹
Total Funds employed		4,80,000
Less: Long Term External Liabilities		Nil
Proprietary Funds employed		**4,80,000**
Represented by: 1. Share Capital (balancing figure)	3,20,000	
2. Reserves and Surplus	1,60,000	**4,80,000**

Note: The above information can also be presented in the form of T-shaped Balance Sheet.

Question 48

From the following information, complete the Balance Sheet given below:

Equity Share Capital	**₹ 2,00,000**	**Inventory Turnover**	**8 times**
Total Debt to Owner's Equity	**0.75**	**Fixed Assets to Owner's Equity**	**0.60**
Total Assets Turnover	**2 times**	**Current Debt to Total Debt**	**0.40**

Balance Sheet of XYZ Co. as on 31st March

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	2,00,000	Fixed Assets	?
Long Term Debt	?	Current Assets: Inventory	?
Current Debt	?	Cash	?

Solution: With the various supporting calculations, the Balance Sheet is compiled as under -

Liabilities	₹	Assets	₹
Equity Share Capital - **given**	2,00,000	Non-Current Assets, i.e. Fixed Assets- **WN 1**	1,20,000
Long Term Debt - **WN 4**	90,000	Current Assets - Inventory - **WN 7**	87,500
Current Liabilities - **WN 3**	60,000	- Other Current Assets **(bal.fig)**	**1,42,500**
Total(WN 5)	**3,50,000**	**Total (WN 5)**	**3,50,000**

Working Notes and Calculations

1. $\frac{\text{Fixed Assets}}{\text{Equity}}$ = 0.6 So, $\frac{\text{Fixed Assets}}{₹\ 2,00,000}$ = 0.60. Hence, **Fixed Assets** = ₹ 2,00,000 × 0.60 = **₹ 1,20,000**

2. $\frac{\text{Total Debt}}{\text{Equity}}$ = 0.6 So, $\frac{\text{Total Debt}}{₹\ 2,00,000}$ = 0.75. Hence, **Total Debt** = ₹ 2,00,000 × 0.75 = **₹ 1,50,000**

3. $\frac{\text{Current Debt}}{\text{Total Debt}}$ = 0.4 So, $\frac{\text{Current Debt}}{₹\ 1,50,000}$ = 0.40 Hence, **Current Liabilities** = ₹ 1,50,000 × 0.4 = **₹ 60,000**

4. **Long Term Debt** = Total Debt - Current Debt = ₹ 1,50,000 **(WN 2)** - ₹ 60,000 **(WN 3)** = **₹ 90,000**

5. **Total Liabilities** = Equity + Total Debt = ₹ 2,00,000 **(given)** + ₹ 1,50,000 **(WN 2)** = **₹ 3,50,000** = **Total Assets.**

6. $\frac{\text{Turnover}}{\text{Total Assets}}$ = 2 So, $\frac{\text{Turnover}}{₹\ 3,50,000}$ = 2 Hence, **Turnover** = ₹ 3,50,000 × 2 = **₹ 7,00,000**

7. $\frac{\text{Turnover}}{\text{Inventory}}$ = 8 So, $\frac{₹\ 7,00,000}{\text{Turnover}}$ = 8 Hence, **Inventory** = $\frac{₹\ 7,00,000}{8}$ = **₹ 87,500**

Question 49

Using the information given below, complete the Balance Sheet of PQR Private Limited.

Current Ratio	1.6:1	Gross Profit Ratio	20%
Cash and Bank Balance	15% of Total Current Assets	Capital Gearing Ratio	0.6
Debtors Turnover Ratio	12 times	Depreciation Rate	15% on WDV
Stock Turnover (Cost of Goods Sold) Ratio	16 times	Net Fixed Assets	20% of Total Assets
Creditors Turnover (Cost of Goods Sold) Ratio	10 times	Assume all Purchases	& Sales are on credit.

Balance Sheet of PQR Private Limited

Liabilities		₹	Assets		₹
Share Capital		25,00,000	Fixed Assets: Opening WDV	?	
Reserves and Surplus		?	Less: Depreciation	?	?
12% Long Term Debt		?	Current Assets:		
Current Liabilities:			Stock	?	
Creditors	?		Debtors	?	
Provisions & O/s Expenses	?	68,50,000	Cash and Bank Balance	?	?
Total		?	Total		?

Solution: Balance Sheet of PQR Private Limited

Liabilities	₹	₹	Assets	₹	₹
Share Capital (given)		25,00,000	Fixed Assets: Opening WDV	32,23,529	(WN 4)

Reserves and Surplus	**(WN 6)**	17,81,250	**(WN 5)** Less: Depreciation	(4,83,529)	27,40,000
Liabilities	**₹**	**₹**	**Assets**	**₹**	**₹**
12% Long Term Debt	**(WN 6)**	25,68,750	**Current Assets:**		
Current Liabilities:			Stock **(WN 7)**	34,93,500	
Creditors **(WN 8)**	55,89,600		Debtors **(WN 7)**	58,22,500	**(WN 1)**
Provisions & O/s Exps	12,60,400	68,50,000	Cash & Bank Bal. **(WN 2)**	16,44,000	1,09,60,000
Total (WN 3)		**1,37,00,000**	**Total (WN 3)**		**1,37,00,000**

Working Notes and Calculations

1. Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$ = 1.6 So, Current Assets = 1.6 x Current Liabilities = 1.6 × ₹ 68,50,000

So, Current Assets = **₹ 1,09,60,000**

2. Cash and Bank Balances = 15% of Total Current Assets = 15% of ₹ 1,09,60,000 = ₹ **16,44,000**

3. Net Fixed Assets = 20% of Total Assets. So, Current Assets = 100% - 20% = 80% of Total Assets.

Therefore, Total Assets = $\frac{\text{Current Assets}}{80\%} = \frac{₹\ 1,09,60,000}{80\%}$ = **₹ 1,37,00,000 (**= Total of Liabilities Side also.)

4. Net Fixed Assets = 20% of Total Assets≡ 20% of ₹ 1,37,00,000 = ₹ **27,40,000**

5. Since Depreciation Rate = 15% on WDV, balance Net Fixed Assets = 85%.

Hence, Opening WDV = $\frac{\text{Net Fixed Assets}}{80\%} = \frac{₹\ 27,40,000}{85\%}$ = **₹ 32,23,529**. So, Deprn at 15% = **₹ 4,83,529**

6. From Liabilities Side, we have Share Capital + R&S + Debt + Current Liabilities = Total Liabilities.

Substituting, we have 25,00,000 + R&S + Debt + 68,50,000 = 1,37,00,000

So, we have R&S + Debt = 43,50,000. So, Debt = 43,50,000 (-) R&S

Given that Capital Gearing Ratio = $\frac{\text{Debt}}{\text{S.Cap + R\&S}} = \frac{43,50,000(-)\text{R\&S}}{25,00,000+\text{R\&S}}$ = 0.6

Cross multiplying, we have 43,50,000 (-) R&S = 15,00,000 + 0.6 R&S. Solving, we have R&S = ₹ **17,81,250**

Hence Debt = 43,50,000 (-) R&S = 43,50,000 (-) 17,81,250 = ₹ **25,68,750**

7. Debtors, Stock and Creditors are related to Sales and COGS as per the question. Hence, Let Sales = x. Since GP = 20%, COGS = 100% - 20% = 80% = 0.8x.

Given Debtors Turnover = $\frac{\text{Sales}}{\text{Debtors}} = \frac{x}{\text{Debtors}}$ = 12 times. So, Debtors = $\frac{x}{12}$

Given Stock Turnover = $\frac{\text{Cost of Goods Sold}}{\text{Stock}} = \frac{0.8x}{\text{Stock}}$ = 16 times. So, Stock = $\frac{0.8x}{16}$

Total Current Assets = Stock + Debtors + Cash & Bank = $\frac{0.8x}{16} + \frac{x}{12}$ + 16,44,000 = 1,09,60,000 (from **WN 1 & 2)**

Simplifying, we have $\frac{0.6x}{12} + \frac{x}{12}$ = 1,09,60,000 - 16,44,000. $\frac{1.6x}{12}$ = 93,16,000 So, x = 6,98,70,000.

So, **Sales = ₹ 6,98,70,000, Debtors** = $\frac{x}{12}$ = **₹ 58,22,500 Stock** = $\frac{0.8x}{16}$ = **₹ 34,93,500**

8. Given Creditors Turnover = $\frac{\text{Cost of Goods Sold}}{\text{Creditors}} = \frac{0.8x}{\text{Creditors}}$ = 10 times. So, Creditors = $\frac{0.8x}{10}$ = **₹ 55,89,600**

So, Provisions and O/s Expenses is computed as balancing figure = 68,50,000 - 55,89,600 = ₹ 12,60,400

Question 50

SSR Ltd has furnished the following ratios and information for the year ending 31st March.

Sales	**₹ 60,00,000**	**Current Ratio**	**2 times**
Return on Net Worth	**25%**	**Cost of Goods Sold**	**₹ 18,00,000**
Tax Rate	**50%**	**Interest on Debentures at 15%**	**₹ 60,000**
Share Capital to Reserves	**7:3**	**Sundry Debtors & Sundry Creditors**	**Each ₹ 2,00,000**
Net Profit to Sales (after Tax)	**6.25%**	**Inventory T/O (based on COGS and Closing Stock)**	**12 Times**

You are required to (1) Calculate the Operating Expenses for the year, and prepare a Balance Sheet as at 31st March.

Solution: **Working Notes and Calculations**

1. Stock T/O = $\frac{\text{Cost of Goods Sold}}{\text{Average Stock}} = \frac{₹\ 18,00,000}{\text{Average Stock}}$ = 12. So, Closing Stock= $\frac{₹\ 18,00,000}{12}$ = ₹ 1,50,000

Note: As specified in the Question, Inventory T/o is taken based on Closing Stock, rather than Average Stock.

2. Current Ratio = $\frac{\text{Current Assets}}{\text{Current Liabilities}}$ = 2 times. So, Current Assets = 2 × Current Liabilities = 2 × Creditors

Hence, Current Assets = 2 × ₹ 2,00,000 = ₹ 4,00,000

Inventory	Debtors	Cash and Bank
(WN 1) = ₹ 1,50,000	(given) = ₹ 2,00,000	(bal. fig) ₹ 50,000

3. Return on Net Worth (post-tax) = $\frac{\text{EAT}}{\text{Equity}} = \frac{₹\ 3,75,000}{\text{Equity}}$ = 25%. So, Equity = $\frac{₹\ 3,75,000}{25\%}$ = ₹ 15,00,000

Share Capital	Reserves & Surplus
$\frac{7}{10}$ = ₹ 10,50,000	$\frac{3}{10}$ = ₹ 4,50,000

4. Profit and Loss Statement (to compute Operating Expenses as bal. figure)

Particulars	Computation	₹
Sales	Given	60,00,000
Less: Cost of Goods Sold	Given	18,00,000

	Gross Profit		42,00,000
Less:	Operating Expenses	(balancing figure) (i.e. Gross Profit less EBIT)	33,90,000
	EBIT	By reverse working (EBT + Interest)	8,10,000
Less:	Interest on Debentures	Given	60,000
	EBT	By reverse working (EAT + Tax)	7,50,000
Less:	Tax at 50%	Since Tax Rate = 50% on EBT, EAT = balance 50%. Hence, Tax = EAT	3,75,000
	EAT	= Net Profit after Tax = 6.25% on Sales of ₹ 60,00,000	3,75,000

5. Balance Sheet as on 31st March

Particulars as at 31st March			Note	This Year	Prev. Yr
I	EQUITY AND LIABILITIES:				
(1)	Shareholders' Funds:	Share Capital (WN 3)		10,50,000	
		Reserves and Surplus (WN 3)		4,50,000	
(2)	Non-Current Liabilities	15% Debentures $\frac{₹\ 60,000}{15\%}$		4,00,000	
(3)	Current Liabilities:	Trade Payables, i.e. Creditors (given)		2,00,000	
		Total		21,00,000	
II	ASSETS				
(1)	Non-Current Assets	Fixed Assets (balancing figure)		17,00,000	
(2)	Current Assets:				
	(a) Inventories	(WN 1)		1,50,000	
	(b) Trade Receivables	Debtors (given)		2,00,000	
	(c) Cash and Cash Equivalents	Cash (WN 2)		50,000	
		Total		21,00,000	

Note: For this Question, Balance Sheet is given in Schedule III Format (instead of T-shaped format).